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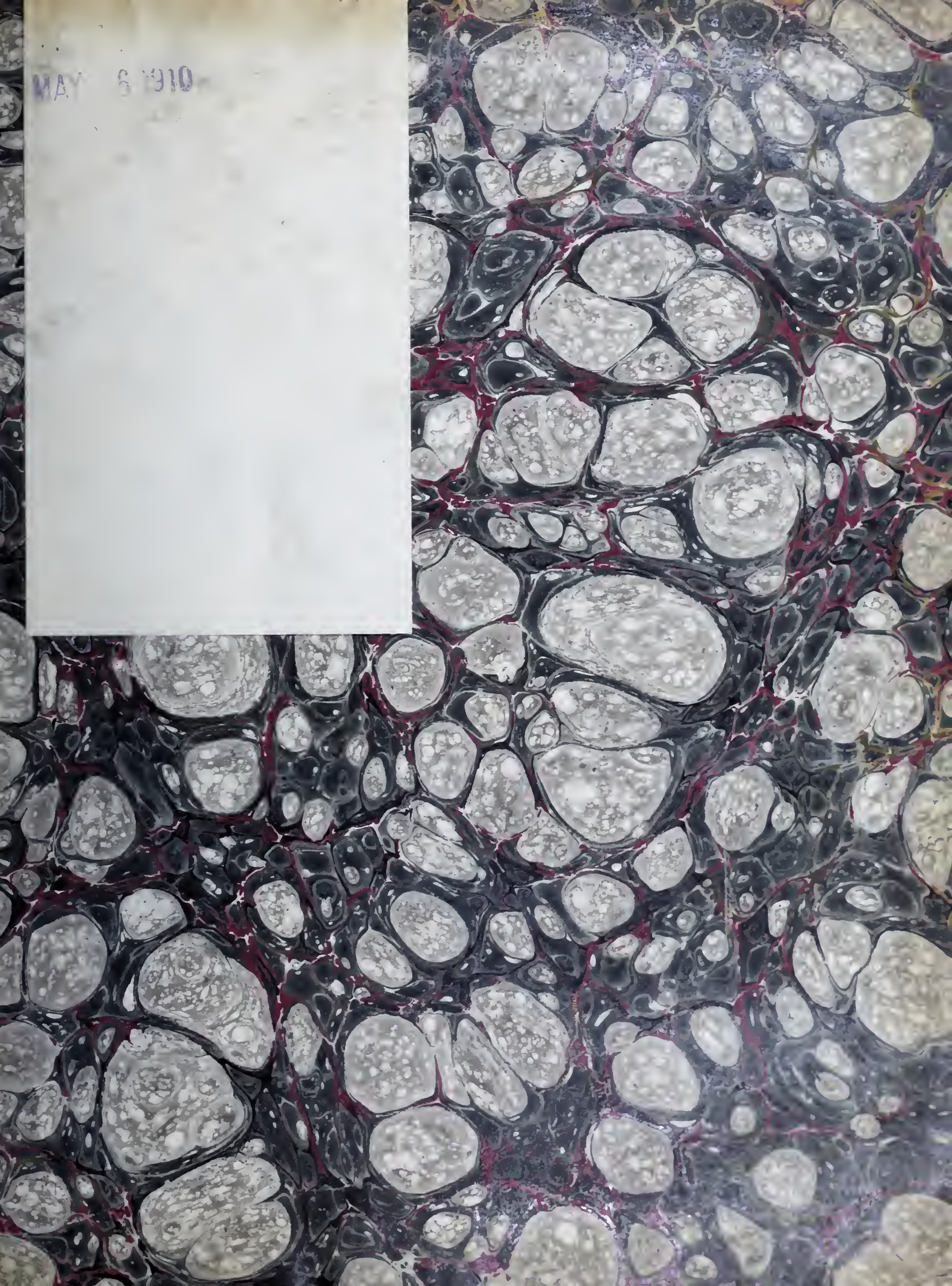

ENCYCLOPÆDIA BRITANNICA.

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Encyclopaedia Britannica:

OR, A

DICTIONARY

OF

ARTS, SCIENCES, AND MISCELLANEOUS LITERATURE;

ENLARGED AND IMPROVED.

THE SIXTH EDITION.

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VOL. XII.

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ENCYCLOPÆDIA BRITANNICA.

Liege. LIEGE, formerly a bishopric of Germany, in the circle of Westphalia; bounded to the north by Brabant, to the south by Champagne and Luxemburg, to the east by Limburg and Juliers, and to the west by Brabant, Namur, and Hainault. It is very unequal both in length and breadth; the former being in some places above 90 miles, in others not half so much; and the latter in some places 45, in others hardly 25. The air here is very temperate; and the soil fruitful in corn, wine, wood, and pasture. Here also are mines of lead and iron, pits of coal, quarries of marble and stone, and some celebrated mineral waters, as those of Spa and Chau-fontaine. The principal rivers are, the Maes and Sambre. The manufactures and commodities of the country are chiefly beer, arms, nails, serge, leather, with the products we have just mentioned. The states of the bishopric are composed of three bodies: the first is the chapter of Liege; the second, the nobility of the country; and the third, the deputies of the capital and the other towns. The three estates are seldom called together, except to raise taxes for the service of the province, or upon some particular emergency; but there is a committee of the states, who meet thrice a-week, and in time of war daily. They are always about the prince-bishop, to make remonstrances, and demand the redress of grievances. The bishop is spiritual and temporal lord of the whole country; but, as bishop, is suffragan to the archbishop of Cologne. He styles himself, *by the grace of God, bishop and prince of Liege, duke of Bouillon, marquis of Franchimont, count of Looz, Hoorn, &c.* His arms for Liege are, a pillar argent, on a pedestal of the same, with a crown or, in a field ruby. In the matricula he was formerly rated at 50 horse and 170 foot; or 1280 florins monthly, in lieu of them, but now only at 826. An abatement of one-third has also been granted of the ancient assessment to the chamber-court, which was 360 rix-dollars $62\frac{1}{2}$ kruitzers for each term. Here are several colleges which sit at Liege, for the government of the country, and the decision of causes, civil, criminal, spiritual, and feudal, and of such also as relate to the finances. The chapter consists of 60 persons, who must either prove their nobility for four generations, both by father and mother, before they can be admitted; or, if they cannot do that, must at least have been doctors or licentiates of divinity for seven years, or, of law, for five years, in some famous university. The bishopric is very populous and extensive, containing 1500 parishes, in which are 24 walled towns, besides others, 52 baronies, besides counties and seignories, 17 abbeys for men, who must be all gentlemen, and 11 for ladies, exclusive of others. Liege.

LIEGE, the capital of the bishopric of the same name, stands upon the Maes, in a fine valley surrounded with woods and hills, being a free imperial city, and one of the largest and most eminent in Europe. Though it is 100 miles from the sea by water, the Maes is navigable up to it. The city has 16 gates; 17 bridges, some of them very handsome; 154 streets, many of them straight and broad; a fine episcopal palace; a very large stately cathedral, in which, besides five great silver coffers full of relics, are several silver statues of saints, and a St George on horseback of massy gold, presented to the cathedral by Charles the Bold, by way of atonement for using the inhabitants cruelly in the year 1468. Of the other churches, that of St Paul is the most remarkable, both for its structure and fine ornaments in painting and marble. The city is well fortified, and there are also two castles on the mountain of the Holy Walburg for its defence. Besides a great number of other convents of both sexes, here is a college of English Jesuits, founded in the year 1616, and a fine nunnery of English ladies. Indeed, churches, convents, and other religious foundations, take up the greater part of it. The reader, therefore, no doubt, will take it for granted, that it is a most blessed, holy, and happy city. But however it may fare with the profane, unhallowed laity, it is certainly the paradise of priests, as it is expressly called, by way of eminence. It is divided into the old and new, or the upper and lower; and the latter again into the island, and the quarter beyond the Maes. The houses are high, and built of bluish marble. In the town and suburbs are 12 public places or squares, 10 hospitals, a beguin-house, and two fine quays, planted with several rows of trees, for the burghers to take the air; but a great part of that within the walls is taken up with orchards and vineyards. The manufactures of this city are arms, nails, leather, serge, and beer. In St William's convent, without the city, is the tomb of the famous English traveller Sir John Mandeville, with an inscription in barbarous French, requesting those who read it to pray for his soul. Near it are kept the saddle, spurs, and knife, that he made use of in his travels. Liege.

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Liege. After having seen most of the cities of any note in the world, he made choice of this to spend the eve of his life in. A little way from the city, on the other side of the Maes, stands the episcopal palace of Seraing, in which the bishops generally reside during the summer. The population is estimated at 80,000. N. Lat. 50. 36. E. Long. 5. 40.

Some disturbances took place here in the year 1789, in consequence of certain disputes that had arisen between the prince-bishop and the inhabitants. The latter having demanded certain privileges, which he did not think proper to grant, they took up arms, and compelled him and his chapter to comply with their request. The prince, together with many of the clergy, nobility, and citizens, alarmed by this commotion, and dreading the consequences of popular fury, which when once roused seldom knows any bounds, sought safety by a voluntary exile. They then appealed to the imperial chamber; and this tribunal, instead of acting the part of arbiter, decided as a sovereign, and ordered the circles of the Lower Rhine and Westphalia to execute the sentence.

The king of Prussia, at whose court one of the chiefs of the insurrection had resided, and who wished to gain a party at Liege, became mediator; and seemed to favour the Liegeois, many of whose claims were just, though they attempted to enforce them by violence and the most illegal steps. Intoxicated with this protection, the people of Liege treated the remonstrances of their bishop, the decrees of the imperial chamber, and the resolutions of the directory of the two circles, with the utmost contempt; and proceeded so far as even to dethrone their prince, by appointing a regent in the person of a French prelate. The electoral college having deliberated on the best means of putting an end to these disturbances, its propositions, though modified by M. Dohm the Prussian plenipotentiary, made the insurgents break out into open sedition. Deluded by their leaders, they gave themselves up every day to new excesses; the effects of the citizens were exposed to pillage, and their persons to insult. The king of Prussia, who was desirous to bring matters to an accommodation, and not to instigate the Liegeois to become independent, finding that the efforts of his minister were not attended with the desired success, seemed unwilling to interfere any farther in an affair which might have led him into a quarrel with the empire. The executive troops, at the same time, remained almost in a state of inactivity; and seemed rather to guard the frontiers of this petty state, than to make any attempt to reduce it to obedience. Neither this conduct, however, nor the exhortations of Prussia, added to the moral certainty of their being soon compelled to lay down their arms, made any change in the conduct of the malecontents. They declared openly, in the face of all Europe, that they would either conquer or die; and they persisted in this resolution, while commerce, manufactures, and the public revenues, were going daily to decay.

Having at length openly attacked the executive forces without the territories of their city, the emperor could no longer remain an indifferent spectator. It was now full time to put a period to that madness to which the people had abandoned themselves; and to accomplish this in an effectual manner, the imperial chamber at Wetzlar requested the emperor, as a member of the ancient circle of Burgundy, to execute its orders respecting this object. In consequence of this measure, Baron Alvinzi, who commanded a body of Austrians cantoned in Limburg and the confines of Brabant, notified, by order of Marshal Bender, to the states and municipality of Liege, that the emperor intended to send troops into their city and territories, for the purpose of restoring tranquillity and good order. The states had already been informed of this resolution by their agent at Wetzlar. They therefore wrote to Marshal Bender, to assure him of the respectful confidence which they placed in the justice and magnanimity of the emperor, and to request that the Austrian troops might enter alone, without those of the electors; and that they might be confined to occupy the gates and the suburbs only. To this letter, which was carried to Brussels by a deputation of the states, Marshal Bender returned a very satisfactory answer, relating to the disposition of the electoral troops: but Baron Alvinzi, in a note which he wrote to the states, insisted among other articles, that all the citizens should throw down their arms; that proper accommodations should be prepared for the officers and men; that the warlike stores, collected for making resistance, should be removed; and that cockades, and every other distinctive mark of the like kind, should be laid aside before the arrival of the imperial troops. However humiliating these preliminaries might be, especially that of a general disarming, the states and municipalities acquiesced without the least reserve; and their submission, as sudden as complete, was communicated to the people, with an exhortation to follow their example.

Liege, Lientery || Lievens.

Notwithstanding this pacific appearance, two days before the entrance of the imperial troops, the municipal council of Liege, flattering themselves, perhaps, with the hopes of assistance from Prussia, assured the inhabitants that they would remain unshaken in their post, and that they had sworn never to desert the cause in which they were engaged. This, however, did not prevent the Austrian troops, to the number of 6000, from penetrating, without opposition, into the heart of the city; where they occupied every post; made the citizens lay aside their arms, uniforms, and cockades; and in a single hour, dethroned so many sovereigns of a year. The greater part of the municipal officers, who two days before had solemnly promised such great things, betook themselves to flight, and retired either to France or Wesel; while the ancient magistracy, which had been expelled in the month of August 1789, was provisionally reinstated by the directorial commissioners.—The decrees of the imperial chamber at Wetzlar have since been executed in their utmost extent. The ancient magistracy was restored; and the prince himself returned. The French took this city in 1792, were driven out in 1793, but occupied it again in 1794. From this time they retained possession of it till 1815, when it was annexed to the kingdom of the Netherlands.

LIENTERY, a flux of the belly, in which the aliments are discharged as they are swallowed, or very little altered either in colour or substance. See MEDICINE *Index*.

LIEVENS, JOHN or JAN, a celebrated painter, was born.

Lievens, Lieou-Kieou.

born at Leyden in 1607. He discovered an early inclination for the arts, and was the disciple first of Joris van Schooten, and afterwards of Peter Lastman. He excelled principally in painting portraits; but he also executed several historical subjects with great success. He came over to England, where he resided three years, and painted the portraits of Charles I. the queen, the prince of Wales, and several of the nobility; after which he returned to Antwerp, where he met with full employment for his pencil. We have several etchings by this master, which are performed in a slight but masterly manner. The chiaro scuro is very skilfully managed in them, so as to produce a most powerful effect. His style of etching bears some resemblance to that of Rembrandt; but it is coarser in general, and less finished.

LIEOU-KIEOU, or Loo-Choo, the name of certain islands of Asia, subject to China; but hitherto little known to geographers, who have been satisfied with marking their existence and latitude in their charts. They, however, form a considerable empire, the inhabitants of which are civilized, and ought not to be confounded with other savage nations dispersed throughout the islands of Asia. Father Gabil, a Jesuit, has furnished us with some interesting details respecting these islanders; and the journals of the officers who visited Loo-Choo in 1817, in the Alceste and Lyra, have made us well acquainted with their manners and situation. Father Gabil informs us, that the emperor Kang-hi having resolved, in 1719, to send an ambassador to the king of Lieou-kieou, chose for this purpose one of the great doctors of the empire, named *Supao-Koang*. This learned man departed from China in 1719, and returned to Peking in 1720, where, in the year following, he caused a relation of his voyage to be published in two volumes. It is in the first of these that he gives an accurate and particular description of the isles of Loo-Choo; and of the history, religion, manners, and customs, of the people who inhabit them.

These isles, situated between Corea, Formosa, and Japan, are in number 36. The principal and largest is called *Loo-Choo;* the rest have each a particular denomination. The largest island extends from south-west to north-east about 56 miles, with a breadth of 11 miles. According to the Chinese account, the south-east part of the island, where the court resides, is called *Cheou-li;* and it is there that Kin-tching, the capital city, is situated. The king's palace, which is reckoned to be four leagues in circumference, is built on a neighbouring mountain. The existence of these islands was not known in China before the year 605 of the Christian era. It was in the course of that year that one of the emperors of the dynasty of Soui, having heard of these isles, was desirous of knowing their situation. This prince at first sent some Chinese thither; but their expedition proved fruitless, as the want of interpreters prevented them from acquiring that knowledge which was the object of their voyage. They only brought some of the islanders with them to Sigan-fou, the capital of the province of Chen-si, which was the usual residence of the emperors of the dynasty of Soui. It fortunately happened, that an ambassador of the king of Japan was then at court. This ambassador and his attendants immediately knew the strangers to be natives of Loo-Choo: but they spoke of these isles as of a miserable and wretched country, the inhabitants of which had never been civilized. The emperor of China afterwards learned, that the principal island lay to the east of a city called at present *Fou-tcheou-fou*, which is the capital of the province of Fokien; and that, in a passage of five days, one might reach the large island where the king kept his court. Lieou-Kieou.

On this information, the emperor Yang-ti sent skilful men, accompanied by interpreters, to summon the prince to do homage to the emperor of China, and to pay him tribute. This proposal was very ill received. The king of Lieou-kieou sent back the Chinese, telling them sternly, that he acknowledged no prince to be his superior. This answer irritated the emperor, who, to obtain revenge, caused a fleet to be immediately equipped in Fokien, in which he embarked 10,000 men. This fleet set sail, and arrived in safety at the port of Napa-kiang. The army, in spite of every effort made by the natives, landed on the island; and the king, who had put himself at the head of his troops to oppose the enemy, having fallen in battle, the Chinese pillaged, sacked, and burnt the royal city, made more than 5000 slaves, and returned to China.

It was only in 1372, under the reign of Hong-vou, founder of the dynasty of Ming, that these islands submitted voluntarily to the Chinese government. Hong-vou had sent one of the grandees of his court to Tsay-tou, who was then reigning at Lieou-kieou, to inform him of his accession to the throne. The Chinese nobleman had received particular instructions respecting this commission, and he acquitted himself of it with all the prudence and address of an able minister. In a private audience which he had with Tsay-tou, he exhorted this prince to declare himself a tributary of the empire, and laid before him the advantages he would derive from this step. His reasoning, supported by the power of his natural eloquence, made so much impression on the mind of Tsay-tou, that he embraced the proposal made him, and sent immediately to the emperor to demand the investiture of his states.

Hong-vou received his envoys in a magnificent manner, and loaded them with presents. He solemnly declared Tsay-tou a vassal of the empire; and, after having received his first tribute (which consisted in valuable horses, aromatic wood, sulphur, copper, tin, &c.) he sent to this prince a golden seal, and confirmed the choice he had made of one of his sons for successor. The emperor afterwards sent 36 families, almost all from the province of Fokien, to Loo-Choo. Tsay-tou received them, assigned them lands near the port of Napa-kiang, and appointed certain revenues for their use, at the same time that Hong-vou made them considerable remittances. These families first introduced into Loo-Choo the learned language of the Chinese, the use of their characters, and the ceremonies practised in China in honour of Confucius. On the other hand, the sons of several of the grandees of the court of Tsay-tou were sent to Nan-king, to study Chinese in the imperial college, where they were treated with distinction, and maintained at the emperor's expence.

The isles of Lieou-kieou had neither iron nor porcelain. Hong-vou supplied this want; he caused a great number of utensils of iron and instruments to be made,

Lieou-Kieou.

which he sent thither, together with a quantity of porcelain vessels. Commerce, navigation, and the arts soon began to flourish. These islanders learned to cast bells for their temples, to manufacture paper and the finest stuffs, and to make porcelain, with which they had been supplied before from Japan.

The celebrated revolution which placed the Tartars on the imperial throne of China, produced no change in the conduct of the kings of Lieou-kieou. Chang-tché, who was then reigning, sent ambassadors to acknowledge Chun-tchi, and received a seal from him, on which were engraven some Tartar characters. It was then settled, that the king of Loo-Choo should pay his tribute only every two years, and that the number of persons in the train of his envoys should not exceed 150.

A very interesting account of the manners of the inhabitants is given by Captain Hall. 'Their manners,' he says, 'are remarkably gentle and unassuming. They are observant, and not without curiosity; but they require encouragement to induce them to come forward, being restrained, it would seem, by a genteel self-denial, from gratifying curiosity, lest it might be thought obtrusive. Their dress is singularly graceful; it consists of a loose flowing robe, with very wide sleeves, tied round the middle by a broad rich belt or girdle of wrought silk, a yellow cylindrical cap, and a neat straw sandal, over a short cotton boot or stocking. Two of the chiefs wore light yellow robes, the other dark blue, streaked with white, all of cotton. The cap is flat at top. They all carry fans, which they stick in their girdles when not in use; and each person has a short tobacco-pipe in a small bag, hanging, along with the pouch, at the girdle. Many wear printed cottons, others have cotton dresses with the pattern drawn on it by hand, instead of being stamped; but blue, in all its shades, is the prevalent colour, though there were many dresses resembling in every respect Highland tartans. The children, in general, wear more showy dresses than the men; and of the dress of the women we can say nothing, as none have yet been seen. Every person has one of the girdles before described, which is always of a different colour from the dress, and is, in general, richly ornamented with flowers in embossed silk, and sometimes with gold and silver threads. This dress is naturally so graceful, that even the lowest boatmen have a picturesque appearance. Their hair, which is of a glossy black, is shaved off the crown; but the bare place is concealed by their mode of dressing the hair in a close knot over it. Their beards and mustachios are allowed to grow, and are kept neat and smooth. They are rather low in stature, but are well formed, and have an easy graceful carriage, which suits well with their flowing dress. Their colour is not good, some being very dark and others nearly white; but in most instances they are of a deep copper. This is fully compensated for by the sweetness and intelligence of their countenance. Their eyes, which are black, have a placid expression, and their teeth are regular and beautifully white. In deportment they are modest, polite, timid, and respectful; and, in short, appear to be a most interesting and amiable people. The sick were accommodated in the gardens of a temple or place of worship, of which the natives appeared to make very little use, and where they were treated with the kindest and most unwearied attention by all classes of the inhabitants. Milk, eggs, meat, and vegetables, were brought to them every day; and whenever they felt disposed to walk, they were accompanied by one or two of the natives, who took their arms on coming to rough ground, and often helped them up the steep side of the hill behind the hospital, to a pleasant grassy spot on the summit, where the natives lighted pipes for them.' The rest of the crew, however, and even the officers, were a good deal restricted in their communications with the interior, being specially interdicted from entering the town or large village near the landing place, and generally confined, indeed, either to a walk along the beach, or to the top of a small eminence in the neighbourhood.

Lieou-Kieou.

'Every person of rank,' says Captain Hall, 'is attended by a lad, generally his son, whose business it is to carry a little square box, in which there are several small drawers, divided into compartments, filled with rice, sliced eggs, small squares of smoked pork, cakes, and fish: and in one corner a small metal pot of sackee, besides cups and chopsticks. By having this always with them, they can dine when and where they choose. They frequently invite us to dine with them; and, if we agree to the proposal, they generally ask any other of the chiefs whom they meet to be of the party, and join dinners. The place selected for these pic-nics is commonly under the trees, in a cool spot, where a mat is spread on the grass; and every thing being laid out in great order, the party lies down in a circle, and seldom breaks up till the sackee pot is empty.'

But it is not only their manners and tempers that are thus singularly agreeable;—their dispositions seem to be thoroughly amiable and gentle, and their honesty and integrity without blemish. During six weeks continual intimacy, the British officers never saw any thing approaching to a quarrel or affray, nor any punishment inflicted beyond an angry look, or the tap of a fan; and not an article of any kind was stolen, or suspected to be stolen, though every thing was exposed in a way that might have tempted persons, in whose eyes most of them must have been less rare and precious. To complete this picture of the golden age, it is stated, that the chiefs never once appeared to treat the inferior people with harshness or severity; that there was nothing like poverty or distress of any kind to be seen—no deformed persons—and very little appearance of disease; and finally, that they have no arms of any sort for offence or defence, and positively denied having any knowledge of war, either by experience or tradition. It is at least equally certain, that they have no knowledge of, or regard for money; as they appeared to set no value whatever either on the dollars or gold pieces that were offered them by the navigators.

As to their knowledge and attainments, they manufacture salt—build stone arches—cultivate their fields, both for rice, millet, sugar, and other crops, with great neatness—weave and stain their cotton cloths with singular taste—and embroider their girdles and pouches with a great deal of fancy and elegance. Their silks and woolens are said to be brought from China; and the latter, Captain Hall conceives, from their appearance, to have come originally from England. The most remarkable person that appeared, was a chief of the

Lieou-Kicou || Lieutenant

the name of Mádera, who for several weeks dissembled his high rank, and, in the habit of the lower orders, attracted the notice of every one by his singular curiosity and intelligence, and ingratiated himself with every one by his extreme good humour, kindness, and habits of accommodation. In less than a month, he had acquired so much English as to be able to converse very intelligibly, and, on many occasions, to perform the part of an interpreter; and, in a far shorter time, he had so perfectly familiarized himself with our usages, as to have no appearance whatever of awkwardness or embarrassment in the society of the travellers. He and the other chiefs cried bitterly at parting with their English friends.

Their religion, it seems, is that of Buddh or Fo; but it seems to occupy scarcely any share of their regard, and the priests are universally regarded as the lowest and least respected class in the community. These unhappy men are condemned to celibacy, and seemed to have no occupation but to sweep the temple, and keep the walks in the garden in order.

LIEUTAUD, Dr Joseph, counsellor of state and first physician at the court of France, was born at Aix in Provence, and resided principally there till he took the degree of doctor of medicine. After this he prosecuted his studies for some years at Montpelier. He returned to Aix, where he soon acquired extensive practice, and became eminent for literary abilities. He resided there till the year 1750, when he was invited to act as physician to the royal infirmary at Versailles. There he practised with such reputation and success, that he soon arrived at the head of his profession; and in the year 1774, upon the death of M. Senac, he was appointed archiater. His extensive engagements in practice did not prevent him from cultivating the science of medicine in all its branches, and from freely communicating to others the result of his own studies. He published many valuable works; amongst which the following may be accounted the most remarkable. 1. *Elementa Physiologiæ.* 2. *Precis de la Medicine.* 3. *Pratique Precis de la Matiere Medicale.* 4. *Essais Anatomiques.* 5. *Synopsis Universæ Praxeos Medicinæ.* 6. *Historia Anatomico-Medica.* He died at Versailles in 1780, aged 78 years.

LIEUTENANT, an officer who supplies the place and discharges the office of a superior in his absence. Of these, some are civil, as the lords-lieutenants of kingdoms, and the lords-lieutenants of counties; and others are military, as the lieutenant-general, lieutenant-colonel, &c.

Lord-Lieutenant of Ireland, is properly a viceroy; and has all the state and grandeur of a king of England, except being served upon the knee. He has the power of making war and peace, of bestowing all the offices under the government, of dubbing knights, and of pardoning all crimes except high treason; he also calls and prorogues the parliament, but no bill can pass without the royal assent. He is assisted in his government by a privy-council; and on his leaving the kingdom, he appoints the lords of the regency, who govern in his absence.

Lords-Lieutenants of Counties, are officers, who, upon any invasion or rebellion, have power to raise the militia, and to give commissions to colonels and other officers, to arm and form them into regiments, troops, and companies. Under the lords-lieutenants, are deputy-lieutenants, who have the same power; these are chosen by the lords-lieutenants, out of the principal gentlemen of each county, and presented to the king for his approbation. Lieutenant

Lieutenant-Colonel. See Colonel.

Lieutenant-General. See General.

Lieutenant, in the land service, is the second commissioned officer in every company of both foot and horse, and next to the captain, and who takes the command upon the death or absence of the captain.

Lieutenant of Artillery. Each company of artillery hath four; 1 first and 3 second lieutenants. The first lieutenant hath the same detail of duty with the captain, because in his absence he commands the company: he is to see that the soldiers are clean and neat; that their clothes, arms, and accoutrements, are in good and serviceable order; and to watch over every thing else which may contribute to their health. He must give attention to their being taught the exercise, see them punctually paid, their messes regularly kept, and to visit them in the hospitals when sick. He must assist at all parades, &c. He ought to understand the doctrine of projectiles, and the science of artillery, with the various effects of gunpowder, however managed or directed; to enable him to construct and dispose his batteries to the best advantage; to plant his cannon, mortars, and howitzers, so as to produce the greatest annoyance to an enemy. He is to be well skilled in the attack and defence of fortified places; and to be conversant in arithmetic, mathematics, mechanics, &c.

Second Lieutenant in the Artillery, is the same as an ensign in an infantry regiment, being the youngest commissioned officer in the company, and must assist the first lieutenant in the detail of the company's duty. His other qualifications should be equal with those of the first lieutenant.

Lieutenant of a Ship of War, the officer next in rank and power to the captain, in whose absence he is accordingly charged with the command of the ship, as also the execution of whatever orders he may have received from the commander relating to the king's service.

The lieutenant who commands the watch at sea, keeps a list of all the officers and men thereto belonging, in order to muster them when he judges it expedient, and report to the captain the names of those who are absent from their duty. During the night watch, he occasionally visits the lower decks, or sends thither a careful officer, to see that the proper centinels are at their duty, and that there is no disorder amongst the men; no tobacco smoked between decks, nor any fire or candles burning there, except the lights which are in lanthorns, under the care of a proper watch, on particular occasions. He is expected to be always upon deck, in his watch, as well to give the necessary orders with regard to trimming the sails and superintending the navigation, as to prevent any noise or confusion; but he is never to change the ship's course without the captain's directions, unless to avoid an immediate danger.

The lieutenant, in time of battle, is particularly to see that all the men are present at their quarters where they have been previously stationed according to the regulations made by the captain. He orders and exhorts

Lieutenant Life.

horts them everywhere to perform their duty, and acquaints the captain at all other times of the misbehaviour of any person in the ship, and of whatever else concerns the service or discipline.

The youngest lieutenant in the ship, who is also styled *lieutenant at arms*, besides his common duty, is particularly ordered, by his instructions, to train the seamen to the use of small arms, and frequently to exercise and discipline them therein. Accordingly his office, in time of battle, is chiefly to direct and attend them; and at all other times to have a due regard to the preservation of the small arms, that they be not lost or embezzled, and that they are kept clean and in good condition for service.

Lieutenant Reformed, he whose company or troop is broke or disbanded, but continued in whole or half pay, and still preserves his right of seniority and rank in the army.

LIFE, is peculiarly used to denote the animated state of living creatures, or the time that the union of the soul and body lasts.

The Prolongation of Life is made by Lord Bacon one of the three branches of medicine; the other two relating to the preservation of health, and the cure of diseases. See Medicine.

The theory of prolonging life he numbers among the desiderata. Some means or indications that seem to lead to it, he lays down as follow:

Things are preserved in two manners; either in their *identity*, or by *reparation*. In their *identity;* as a fly or ant in amber; a flower, fruit, or wood, in a conservatory of snow; a dead carcase in balsams. By *reparation;* as a flame, or a mechanical engine, &c. To attain to the prolongation of life, both these methods must be used. And hence, according to him, arise three intentions for the prolongation of life; *Retardation* of consumption, proper *reparation*, and *renovation* of what begins to grow old.

Consumption is occasioned by two kinds of depredation; a depredation of the innate spirit, and a depredation of the ambient air. These may be each prevented two ways; either by rendering those agents less predatory, or by rendering the passive parts (viz. the juices of the body) less liable to be preyed on. The spirit will be rendered less predatory, if either its substance be condensed, as by the use of opiates, grief, &c.; or its quantity diminished, as in spare and monastic diets; or its motion calmed, as in idleness and tranquillity. The ambient air becomes less predatory, if it be either less heated by the rays of the sun, as in cold climates, in caves, mountains, and anchorets cells; or be kept off from the body, as by a dense skin, the feathers of birds, and the use of oils and ungnents without aromatics. The juices of the body are rendered less liable to be preyed on, either by making them harder, or more moist and oily; harder, as by a coarse sharp diet, living in the cold, robust exercises, and some mineral baths: moister, as by the use of sweet foods, &c. abstaining from salts and acids; and especially by such a mixture of drink as consists wholly of fine subtile particles, without any acrimony or acidity.

Reparation is performed by means of aliment; and alimentation is promoted four ways: By the concoction of the viscera, so as to extrude the aliment: By exciting the exterior parts to the attraction of the aliment; as in proper exercises and fricatious, and some unctions and baths: By the preparation of the food itself, so as it may more easily insinuate itself, and in some measure anticipate the digestion; as in various ways of dressing meats, mixing drinks, fermenting breads, and reducing the virtues of these three into one: By promoting the act of assimilation itself, as in seasonable sleep, some external application, &c.

Life. Life-Boat.

The *renovation* of what begins to grow old, is performed two ways: By the inteneration of the habit of the body; as in the use of emollients, emplasters, unctions, &c. of such a nature, as do not extract but impress: Or by purging off the old juices, and substituting fresh ones; as in seasonable evacuations, attenuating diets, &c.

The same author adds these three axioms: That the prolongation of life is to be expected, rather from some stated diets, than either from any ordinary regimen or any extraordinary medicines; more from operating on the spirits, and mollifying the parts, than from the manner of feeding; and this mollifying of the parts without is to be performed by substantials, impriments, and occludents. See Longevity.

Life-Boat, a most important invention, consisting in an improvement of the ordinary construction of a boat, by which it cannot be sunk in the roughest sea; so that it is peculiarly fitted for bringing off mariners from wrecks during a storm, and thus saving many valuable lives. The life-boat was first conceived at South Shields, in the county of Durham. A committee of the inhabitants of that town, who had often been the sad witnesses of many melancholy shipwrecks, in which by the ordinary means no relief could be given, in a public advertisement requested information on this subject, with models of boats which would be most proper for the purpose of saving persons from shipwreck. The committee, it would appear, employed Mr Greathead, a boat-builder in South Shields, who had with others presented the model of a boat for this purpose, to build the first boat, which upon trial was found fully to answer the purpose. Two claimants have since appeared for the honour of the invention, which according to Mr Farles, the chairman of the committee, in his letter to Mr Hails the supporter of one claim, belongs to two of the members themselves, namely Mr Farles himself and Mr Rockwood. The claimants above alluded to are Mr Greathead, and a Mr Wouldhave a painter in South Shields, and a very ingenious man, who also presented a model to the committee. The claim of the latter is keenly supported by Mr Hails, in a pamphlet published in 1806, two years after Mr Greathead's pamphlet containing the history and progress of the invention, and of the boats which he had built for the purpose, his application to parliament, and the premium of 1200l. which he received for the invention, &c. and four years after this application to parliament. It is true that in 1802, Mr Wouldhave and his friends asserted his claim in the Monthly Magazine, and in some provincial newspapers; but still this was one year after Mr Greathead's application for reward was made to parliament. But, without being at all understood to decide to whom the merit of the invention is due, we shall leave it to our readers to examine the evidence for themselves, and shall now proceed to give an account of the construction of the life-boat, of which 31 have been built

Life-Boat. built by Mr Greathead, and sent to different parts of Britain, and the north of Europe. The following construction is according to Mr Greathead's plan :

"The length thirty feet; the breadth ten feet; the depth, from the top of the gunwale to the lower part of the keel in midships, three feet four inches; from the gunwale to the platform (within) two feet four inches; from the top of the stems (both ends being similar) to the bottom of the keel, five feet nine inches. The keel is a plank of three inches thick, of a proportionate breadth in midships, narrowing gradually toward the ends, to the breadth of the stems at the bottom, and forming a great convexity downward; the stems are segments of a circle with considerable rakes; the bottom section, to the floor heads, is a curve fore and aft with the sweep of the keel; the floor timber has a small rise curving from the keel to the floor heads; a bilge plank is wrought in on each side next the floor heads, with a double rabbit or groove of a similar thickness with the keel, and on the outside of this are fixed two bilge-trees corresponding nearly with the level of the keel; the ends of the bottom section form that fine kind of entrance observable in the lower part of the bow of the fishing boat called a *coble*, much used in the north; from this part to the top of the stem, it is more elliptical, forming a considerable projection: the sides, from the floor heads to the top of the gunwale, flaunch off on each side, in proportion to about half the breadth of the floor; the breadth is continued far forward toward the ends, leaving a sufficient length of straight side at the top; the sheer is regular along the straight side, and more elevated toward the ends; the gunwale fixed on the outside is three inches thick; the sides, from the under part of the gunwale along the whole length of the regular sheer, extending twenty-one feet six inches, are cased with layers of cork, to the depth of 16 inches downward; and the thickness of this casing of cork being four inches, it projects at the top a little without the gunwale; the cork on the outside is secured with thin plates or slips of copper, and the boat is fastened with copper nails; the thwarts (or seats) are five in number, double banked, consequently the boat may be rowed with ten oars; the thwarts are firmly stanchioned; the side oars are short (A), with iron tholes, and rope grommets, so that the rower can pull either way. The boat is steered with an oar at each end; and the steering oar is one-third longer than the rowing oar; the platform placed at the bottom within the boat, is horizontal the length of the midships, and elevated at the ends, for the convenience of the steerman, to give him a greater power with the oar. The internal part of the boat next the sides, from the under part of the thwarts down to the platform, is cased with cork; the whole quantity of which, affixed to the life-boat, is nearly seven hundred weight; the cork indisputably contributes much to the buoyancy of the boat when full of water, is a good defence when going alongside a vessel, and is of principal use in keeping the boat in an erect position in the sea, or rather of giving her a very lively and quick disposition to recover from any sudden Life-Boat. cant or lurch which she may receive from the stroke of a heavy wave: but, exclusive of the cork, the admirable construction of this boat gives it a decided preeminence. The ends being similar, the boat can be rowed either way, and this peculiarity of form alleviates her in rising over the waves; the curvature of the keel and bottom facilitates her movement in turning, and contributes to the ease of the steerage, as a single stroke of the steering oar has an immediate effect, the boat moving as it were upon a centre; the fine entrance below is of use in dividing the waves, when rowing against them; and combined with the convexity of the bottom and the elliptical form of the stem, admits her to rise with wonderful buoyancy in a high sea, and to launch forward with rapidity, without shipping any water, when a common boat would be in danger of being filled. The flaunching or spreading form of the boat, from the floor heads to the gunwale, gives her a considerable bearing; and the continuation of the breadth well forward, is a great support to her in the sea: and it has been found by experience that boats of this construction are the best sea boats for rowing against the turbulent waves. The internal shallowness of the boat from the gunwale down to the platform, the convexity of the form, and the bulk of cork within, leave a very diminished space for the water to occupy; so that the life-boat, when filled with water, contains a considerably less quantity than the common boat, and is in no danger either of sinking or overturning.

It may be presumed by some, that in cases of high wind, agitated sea, and broken waves, a boat of such a bulk could not prevail against them by the force of the oars; but the life-boat, from her peculiar form, may be rowed a-head, when the attempt in other boats would fail (B). Boats of the common form, adapted for speed, are of course put in motion with a small power; but for want of buoyancy and bearing, are overrun by the waves and sunk, when impelled against them: and boats constructed for burthen, meet with too much resistance from the wind and sea, when opposed to them, and cannot in such cases be rowed from the shore to a ship in distress. An idea has been entertained that the superior advantages of the life-boat are to be ascribed solely to the quantity of cork affixed; but this is a very erroneous opinion, and I trust has been amply refuted by the preceding observations on the construction of this boat. It must be admitted that the application of cork to common boats would add to their buoyancy and security; and it might be a useful expedient, if there was a quantity of cork on board of ships, to prepare the boats with, in cases of shipwreck, as it might be expeditiously done in a temporary way, by means of clamps, or some other contrivance. The application of cork to some of the boats of his majesty's ships (the launches) might be worthy of consideration, more particularly, as an experiment might be made at a little expence, and without injury to the boats.

"The life-boat is kept in a boat-house, and placed upon

(A) The short oar is more manageable, in a high sea, than the long oar, and its stroke is more certain.

(B) An extraordinary case might certainly happen, when a forcible combination of the wind, the waves, and the tide, might render it impracticable to row the life-boat from the shore.

Life-Boat. upon four low wheels, ready to be moved at a moment's notice. These wheels are convenient in conveying the boat along the shore to the sea; but if she had to travel upon them, on a rough road, her frame would be exceedingly shaken; besides, it has been found difficult and troublesome to replace her upon these wheels, on her return from sea.

"Another plan has therefore been adopted: two wheels of 12 feet diameter, with a moveable arched axis, and a pole fixed thereto, for a lever, have been constructed. The boat is suspended, near her centre, between the wheels, under the axis; toward each extremity of which is an iron pin. When the pole is elevated perpendicularly, the upper part of the axis becomes depressed, and a pair of rope slings, which go round the boat, being fixed to the iron pins, she is raised with the greatest facility, by means of the pole, which is then fastened down to the stem of the boat."

Temporary Life-Boat,—an invention by the reverend Mr Bremner, minister of Walls and Flota in Orkney, by which any ordinary ship's boat may be converted into a life-boat, so that in cases of shipwreck, the crew may be saved by means of their own boats. Mr Bremner states, in describing his plan to the Highland Society of Scotland, that it had received the approbation of the Trinity houses of London and Leith, of the Royal Humane Society of London, and of many captains of merchantmen. An experiment was made in the port of Leith under the superintendence of Mr Bremner himself, and in presence of a committee of the directors of the society. This experiment proved satisfactory to the committee, whose favourable report to the directors induced them to present Mr Bremner with a piece of plate in testimony of their approbation of his scheme. The following is a general description of the method of preparing a boat for this purpose.

"The dimensions of the sloop's boat, with which the experiment was tried, were 14 feet in length, 5 feet 4 inches in width, and 2 feet 2 inches in depth. The only addition or previous preparation of the boat, was four ring bolts in the inside, and two auger bores or holes in the outside of the keel, as points of security for fixing the necessary seizing ropes (c). The ring bolts, within side the keel, were placed, the one forward, one-third from the stem, the other aft, one-third from the stern; the other two, the one directly at the stem, the other at the stern. The auger bores, outside the keel, being half way betwixt the rings, viz. the one betwixt the two rings forward, the other betwixt the two rings aft.

"Two empty hogsheads were then placed in the fore part of the boat, parallel and close to each other, and laid lengthways, fore and aft. These were secured in their places by passing the seizing ropes round all, that is, over the gunwales and through the auger bore in the keel, as also from the ring bolt in the stem to that next it in the keel, taking care in doing this, to pass the rope also through eyes on the slings of the casks, which have been previously prepared. The same process was observed in the after part of the boat. And lastly, a bar of iron about three hundred weight, was Life-Boat. fixed to the keel, on the inside. A small quantity of cork was also placed in the stern, intended chiefly to raise to a proper height the casks placed above it, but without which the result of the experiment would have been the same.

"The quantity of cork necessary, which will depend on the size of the boat, is to be made up into several parcels, but none larger than one person can easily manage. Each parcel to be properly secured and numbered, so as that the whole may fit and fill up the boat completely, in the spaces betwixt the ring bolts, fore and aft, as above described; and to answer the end, it is material that there should be cork enough to rise nearly three feet above the gunwales, so as to form an arch from gunwale to gunwale. The cork being thus laid in the boat, it is to be properly secured, first by passing a strong rope round all, over the gunwales, and through the auger bore, outside the keel; as also by passing seizing ropes from the ring bolt in the stem, to that next it in the keel, taking care to make as many turns and seizings betwixt these ring bolts, as completely to secure the cork from slipping out. The very same thing to be done as to the rope round the gunwales, and through the hole outside the keel, with seizing ropes from the ring bolts, to be made aft, or in the stern of the boat.

"Where cork cannot be had, or may not be kept in readiness on account of its expence, which, however, is not very great, casks will answer the purpose, though it may be doubtful whether there would not be a greater chance that the fury of the waves might unloose them, unless particular care was taken to have them properly fixed. In the case of casks, two empty ones are to be placed in the fore part of the boat, parallel to one another, close together, and to be laid lengthwise fore and aft. Two other empty casks to be placed in the same way in the stern, or aft part of the boat, and the whole to be secured as firmly and compactly as possible, by strong ropes round the boat and casks, and also by seizing ropes in the same way as described in the case of cork; then two other empty casks, of the same dimensions, one fore, and another aft, to be placed over and in the middle between the two already fixed, and to be firmly secured, as above-mentioned.

"As the boat is to be thus prepared on the deck of the ship, when danger appears, a piece of sail should be thrown in below, betwixt, and about the casks, for the more effectually securing them, and to prevent the seizing ropes from so readily slipping; it would be proper also to have slings on the casks, with eyes in them, through which to pass the seizing ropes.

"Lastly, both in the case of cork and casks, an iron bar, of about three hundred weight, for such a boat as above described, should be secured to the keel on the inside, in the middle or empty space. This middle, or empty space of the boat, is for the sailors, and in a ship's boat of the common size may hold eight people, with room to work a pair of oars. Every thing being previously

(c) It is probable, that ring bolts fixed in the gunwales, might answer as well as passing the ropes round the bottom of the boat and through the auger bores in the keel.

Life-Boat || Ligature.

previously ready, it is certain that the necessary fixing of the casks will not take up above ten or twelve minutes, and it is obvious the cork can be fixed in a much shorter period. It is also completely ascertained, that a boat so prepared, though full of water, will not sink, but on the contrary be extremely buoyant, and will easily go a-head: That it would be next to impossible the boat should overset; but, in case of this at any time happening, she would instantly return to her proper position on her keel. Though the experiment was tried only with casks, with but a small quantity of cork, as before stated, yet it is generally believed, and Mr Bremner himself is of the same opinion, that it might answer equally well, and perhaps better, to have the cork or casks stowed in midships, leaving an empty space in each end, by which means the management of the boat by the helm or rudder would be preserved, though the other plan seems better, in the view of using oars.

Vegetable Life. See PLANTS.

Life-Rent, in *Scots Law*. When the use and enjoyment of a subject is given to a person during his life, it is said to belong to him in life-rent.

LIGAMENT, in its general sense, denotes any thing that ties or binds one part to another.

LIGAMENT, in *Anatomy*, a strong compact substance, serving to join two bones together. See ANATOMY, N° 7.

LIGARIUS, QUINTUS, a Roman proconsul in Africa, 49 B. C. Taking part with Pompey, he was forbid by Julius Cæsar to return to Rome: to obtain his pardon, Cicero made that admired oration in his defence, which has immortalized the memory of the client with that of his celebrated advocate.

LIGATURE, in *Surgery*, is a cord, band, or string; or the binding any part of the body with a cord, band, fillet, &c. whether of leather, linen, or any other matter.

Ligatures are used to extend or replace bones that are broken or dislocated; to tie the patients down in lithotomy and amputations; to tie upon the veins in phlebotomy, on the arteries in amputations, or in large wounds; to secure the splints that are applied to fractures; to tie up the processes of the peritonæum with the spermatic vessels in castration; and, lastly, in taking off warts or other excrescences by ligature.

LIGATURE, is also used to signify a kind of bandage or fillet, tied round the neck, arm, leg, or other part of the bodies of men or beasts, to divert or drive off some disease, accident, &c.

LIGATURE, is also used for a state of impotency, in respect to venery, pretended to be caused by some charm or witchcraft.

Kæmpfer tells of an uncommon kind of ligature or knotting, in use among the people of Macassar, Java, Malacca, Siam, &c. By this charm or spell, a man binds up a woman, and a woman a man, so as to put it out of their power to have to do with any other person; the man being thereby rendered impotent to any other woman, and all other men impotent with respect to the woman.

Some of their philosophers pretend, that this ligature may be effected by the shutting of a lock, the drawing of a knot, or the sticking of a knife in the wall, at the point of time wherein the priest is joining a couple together; and that a ligature, thus effected, may be dissolved, by the spouse's urining through a ring. This piece of superstition is said to obtain also among the Christians of the East. Ligature, Light.

The same author tells us, that during the ceremony of marriage in Russia, he observed an old fellow lurking behind the church-door, and mumbling over a string of words; and, at the same time, cutting a long rod, which he held under his arm into pieces; which, it seems, is a common practice at the marriages of great persons, and done with design to elude and counterwork any other person that might possibly be inducing the ligature.

The secret of inducing a ligature is delivered by the same author, as he was taught it on the spot by one of their adepts: but it is too absurd and obscene to deserve being transcribed here.

M. Marshal mentions a ridiculous form of ligature, which he received from a bramin of Indostan: "If (says he) the little worm in the wood lukerara kara be cut into two, and the one part stirs and the other not, if the stirring part be bruised, and given with half a beetle to a man, and the other half to a woman, the charm will keep each from ever having to do with any other person. Phil. Trans. N° 268.

LIGATURE, in the Italian music, signifies a tying or binding together of notes. Hence syncopes are often called *ligatures*, because they are made by the ligature of many notes. There is another sort of ligatures for breves, when there are many of these on different lines, or on different spaces, to be sung to one syllable.

LIGATURES, among printers, are types consisting of two letters or characters joined together; as *ſt*, *ſs*, *ſt*, *ſl*, *fi*. The old editions of Greek authors are extremely full of ligatures; the ligatures of Stephens are by much the most beautiful.—Some editions have been lately printed without any ligatures at all; and there was a design to explode them quite out of printing. Had this succeeded, the finest ancient editions would in time have grown useless: and the reading of old manuscripts would have been rendered almost impracticable to the learned themselves.

LIGHT, in the most common acceptation of the word, signifies that invisible etherial matter which makes objects perceptible to our sense of seeing. Figuratively, it is also used for whatever conveys instruction to our minds, and likewise for that instruction itself.

For an account of the chemical properties of light, see CHEMISTRY *Index;* and for its physical properties, see OPTICS.

Light independent of Heat. In general, a very considerable degree of heat is requisite to the emission of light from any body; but there are several exceptions to this, especially in light proceeding from putrescent substances and phosphorus, together with that of luminous animals, and other similar appearances. Light proceeding from putrescent animal and vegetable substances, as well as from glow-worms, is mentioned by Aristotle. Thomas Bartholin mentions four kinds of luminous insects, two with wings, and two without; but in hot climates travellers say they are found in much greater numbers, and of different spe- *De luce animal.* p. 163. &c.

Light. cies. Columna, an industrious naturalist, observes, that their light is not extinguished immediately upon the death of the animal.

Light from putrid flesh. *De Visione*, p. 45. The first distinct account that we meet with of light proceeding from putrescent animal flesh is that which is given by Fabricius ab Aquapendente; who says, that when three Roman youths, residing at Padua, had bought a lamb, and had eaten part of it on Easter day 1562, several pieces of the remainder, which they kept till the day following, shone like so many candles when they were casually viewed in the dark. Part of this luminous flesh was immediately sent to Aquapendente, who was professor of anatomy in that city. He observed, that both the lean and the fat of this meat shone with a whitish kind of light; and also took notice, that some pieces of kid's flesh, which had happened to have lain in contact with it, were luminous, as well as the fingers and other parts of the bodies of those persons who touched it. Those parts, he observed, shone the most which were soft to the touch. and seemed to be transparent in candle light; but where the flesh was thick and solid, or where a bone was near the outside, it did not shine.

After this appearance, we find no account of any other similar to it, before that which was observed by Bartholin, and of which he gives a very pompous description in his ingenious treatise already quoted. This happened at Montpelier in 1641, when a poor old woman had bought a piece of flesh in the market, intending to make use of it the day following. But happening not to be able to sleep well that night, and her bed and pantry being in the same room, she observed so much light come from the flesh, as to illuminate all the place where it hung. A part of this luminous flesh was carried as a curiosity to Henry Bourbon, duke of Condé, the governor of the place, who viewed it for several hours with the greatest astonishment.

This light was observed to be whitish; and not to cover the whole surface of the flesh, but certain parts only, as if gems of unequal splendour had been scattered over it. This flesh was kept till it began to putrefy, when the light vanished; which, as some religious people fancied, it did in the form of a cross.

Works, vol. iii. p. 156. It is natural to expect, that the almost universal experimental philosopher Mr Boyle should try the effect of his air-pump upon these luminous substances. Accordingly, we find that he did not fail to do it; when he presently found that the light of rotten wood was extinguished *in vacuo*, and revived again on the admission of the air, even after a long continuance *in vacuo*; but the extinguishing of this light was not so complete immediately upon exhausting the receiver, as some little time afterwards. He could not perceive, however, that the light of rotten wood was increased in condensed air; but this, he imagined, might arise from his not being able to judge very well of the degree of light, through so thick and cloudy a glass vessel as he then made use of; but we find that the light of a shining fish, which was put into a condensing engine before the Royal Society, in 1668, was rendered more vivid by that means. The principal of Mr Boyle's experiments were made in October 1667.

Birch's hist. ii. 254.

This philosopher attended to a great variety of circumstances relating to this curious phenomenon. Among other things he observed, that change of air was not necessary to the maintenance of this light; for it continued a long time when a piece of the wood was put into a very small glass hermetically sealed, and it made no difference when this tube which contained the wood was put into an exhausted receiver. This he also observed with respect to a luminous fish, which he put into water, and placed in the same circumstances. He also found, that the light of shining fishes had other properties in common with that of shining wood; but the latter, he says, was presently quenched with water, spirit of wine, a greater variety of saline mixtures, and other fluids. Water, however, did not quench all the light of some shining veal on which he tried it, though spirit of wine destroyed its virtue presently.

Light.

Mr Boyle's observation of light proceeding from flesh meat was quite casual. On the 15th of February 1662, one of his servants was greatly alarmed with the shining of some veal, which had been kept a few days, but had no bad smell, and was in a state very proper for use. The servant immediately made his master acquainted with this extraordinary appearance; and though he was then in bed, he ordered it to be immediately brought to him, and he examined it with the greatest attention. Suspecting that the state of the atmosphere had some share in the production of this phenomenon, he takes notice, after describing the appearance, that the wind was south-west and blustering, the air hot for the season, the moon was past its last quarter, and the mercury in the barometer was at $29\frac{1}{10}$th inches.

Birch, ii. 70.

Light from fishes.

Mr Boyle was often disappointed in his experiments on shining fishes; finding that they did not always shine in the very same circumstances, as far as he could judge, with others which had shined before. At one time that they failed to shine, according to his expectations, he observed that the weather was variable, and not without some days of frost and snow. In general he made use of whitings, finding them the fittest for his purpose. In a discourse, however, upon this subject at the Royal Society in 1681, it was asserted, that, of all fishy substances, the eggs of lobsters, after they had been boiled, shone the brightest. Olig. Jacobœus observes, that, upon opening a sea-polypus, it was so luminous as to startle several persons who saw it; and he says, that the more putrid the fish was, the more luminous it grew. The nails also, and the fingers of the persons who touched it, became luminous; and the black liquor which issued from the animal, and which is its bile, shone also, but with a very faint light.

Act. Hafn. vol. v. p. 282.

Mr Boyle draws a minute comparison between the light of burning coals and that of shining wood or fish, showing in what particulars they agree, and in what they differ. Among other things he observes, that extreme cold extinguishes the light of shining wood, as appeared when a piece of it was put into a glass tube, and held in a frigorific mixture. He also found that rotten wood did not waste itself by shining, and that the application of a thermometer to it did not discover the least degree of heat.

Of the pholas, a remarkably luminous fish.

There is a remarkable shell-fish called PHOLAS, which forms for itself holes in various kinds of stone, &c. That this fish is luminous, was noticed by Pliny; who observes,

Light. observes, that it shines in the mouth of the person who eats it, and, if it touch his hands or clothes, makes them luminous. He also says that the light depends upon its moisture. The light of this fish has furnished matter for various observations and experiments to M. Reaumur, and the Bolognian academicians, especially Beccarius, who took so much pains with the subject of phosphoreal light.

M. Reaumur observes, that, whereas other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded.

The attention of the Bolognian academicians was engaged to this subject by M. F. Marsilius, in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Com. Bonon vol. ii. 232. Beccarius observed, that though this fish ceased to shine when it became putrid; yet that in its most putrid state, it would shine, and make the water in which it was immersed luminous, when it was agitated. Galeatius and Montius found, that wine or vinegar extinguished this light; that in common oil it continued some days; but in rectified spirit of wine or urine, hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived to 45 degrees; but that it then became suddenly extinct, and could not be revived.

In the experiments of Beccarius, a solution of sea salt increased the light of the luminous water; a solution of nitre did not increase it quite so much. Sal-ammoniac diminished it a little, oil of tartar *per deliquium* nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, ceruse, or sugar, became more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that oil of tartar increased it.

This gentlemen had the curiosity to try how differently coloured substances were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light that was perceived in this case. He then dipped boards painted with the different colours, and also glass tubes, filled with substances of different colours, in water rendered luminous by the fishes. In both these cases the red was hardly visible, the yellow was the brightest, and the violet the dullest. But on the boards the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors into which he put the pholades, milk was rendered the most luminous. A single pholas made seven ounces of milk so luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent. Light.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine, unless bubbles of air were mixed with it. Also Montius and Galeatius found, that, in an exhausted receiver, the pholas lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these pholades permanent. For this purpose he kneaded the juice into a kind of paste, with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever it had done.

Similar, in some respects, to those observations on the light of the pholas, was that which was observed to proceed from wood which was moist, but not in a putrid state, which was very conspicuous in the dark. *Acta Casariensia*, vol. v. p. 485.

That the sea is sometimes luminous, especially when it is put in motion by the dashing of oars or the beating of it against a ship, has been observed with admiration by a great number of persons. Mr Boyle, after reciting all the circumstances of this appearance, as far as he could collect them from the accounts of navigators; as its being extended as far as the eye could reach, and at other times being visible only when the water was dashed against some other body; that, in some seas, this phenomenon is accompanied by some particular winds, but not in others; and that sometimes one part of the sea will be luminous, when another part, not far from it, will not be so; concludes with saying, that he could not help suspecting that these odd phenomena, belonging to great masses of water, were in some measure owing to some cosmical law or custom of the terrestrial globe, or at least of the planetary vortex. Light from sea water.

Some curious observations on the shining of some fishes, and the pickle in which they were immersed, were made by Dr Beale, in May 1665; and had they been properly attended to and pursued, might have led to the discovery of the cause of this appearance. Having put some boiled mackerel into water, together with salt and sweet herbs; when the cook was, some time after, stirring it, in order to take out some of the fishes, she observed, that, at the first motion, the water was very luminous; and that the fish shining through the water added much to the light which the water yielded. The water was of itself thick and blackish, rather than of any other colour; and yet it shined on being stirred, and at the same time the fishes appeared more luminous than the water. Wherever the drops of this water, after it had been stirred, fell to the ground, they shined; and the children in the family diverted themselves with taking the drops, which were as broad as a penny, and running with them about the house. The cook observed, that, when she turned up that side of the fish that was lowest, no light came from it; Dr Beale's experiments on fishes. *Phil. Trans.* vol. lix. p. 450.

Light. it; and that, when the water had settled for some time, it did not shine at all. The day following, the water gave but little light, and only after a brisk agitation, though the fishes continued to shine as well from the inside as the outside, and especially about the throat, and such places as seemed to have been a little broken in the boiling.

When in the light of the sun, he examined, with a microscope, a small piece of a fish which had shined very much the night before, he found nothing remarkable on its surface, except that he thought he perceived what he calls a *steam*, rather dark than luminous, arising like a very small dust from the fish, and here and there a very small and almost imperceptible sparkle. Of the sparkles he had no doubt; but he thought it possible that the steam might be a deception of the sight, or some dust in the air.

Finding the fish to be quite dry, he moistened it with his spittle; and then observed that it gave a little light, though but for a short time. The fish at that time was not fetid, nor yet insipid to the best discerning palate. Two of the fishes he kept two or three days longer for farther trial: but, the weather being very hot, they became fetid: and, contrary to his expectations, there was no more light produced either by the agitation of the water or in the fish.

Father Bourzes's account of luminous sea water.

Father Bourzes, in his voyage to the Indies in 1704, took particular notice of the luminous appearance of the sea. The light was sometimes so great, that he could easily read the title of a book by it, though he was nine or ten feet from the surface of the water. Sometimes he could easily distinguish, in the wake of a ship, the particles that were luminous from those that were not; and they appeared not to be all of the same figure. Some of them were like points of light, and others such as stars appear to the naked eye. Some of them were like globes, of a line or two in diameter; and others as big as one's head. Sometimes they formed themselves into squares of three or four inches long, and one or two broad. Sometimes all these different figures were visible at the same time; and sometimes they were what he calls *vortices* of light, which at one particular time appeared and disappeared immediately like flashes of lightning.

Nor did only the wake of the ship produce this light, but fishes also, in swimming, left so luminous a track behind them, that both their size and species might be distinguished by it. When he took some of the water out of the sea, and stirred it ever so little with his hand, in the dark, he always saw in it an infinite number of bright particles; and he had the same appearance whenever he dipped a piece of linen in the sea, and wrung it in a dark place, even though it was half dry; and he observed, that when the sparkles fell upon any thing that was solid, it would continue shining for some hours together.

His conjectures concerning the cause.

After mentioning several circumstances which did not contribute to this appearance, this father observes, that it depends very much upon the *quality of the water*; and he was pretty sure that this light is the greatest when the water is fattest, and fullest of foam. For in the main sea, he says, the water is not everywhere equally pure; and that sometimes, if linen be dipped in the sea, it is clammy when it is drawn up again: and he often observed, that when the wake of the ship was the brightest, the water was the most fat and glutinous, and that linen moistened with it produced a great deal of light, if it were stirred or moved briskly. Besides, in some parts of the sea, he saw a substance like saw dust, sometimes red and sometimes yellow; and when he drew up the water in those places, it was always viscous and glutinous. The sailors told him that it was the spawn of whales; that there are great quantities of it in the north; and that sometimes, in the night, they appeared all over of a bright light, without being put in motion by any vessel or fish passing by them. Light.

As a confirmation of this conjecture, that the more glutinous the sea water is, the more it is disposed to become luminous, he observes, that one day they took a fish which was called a *bonite*, the inside of the mouth of which was so luminous, that without any other light, he could read the same characters which he had before read by the light in the wake of the ship; and the mouth of this fish was full of a viscous matter, which, when it was rubbed upon a piece of wood, made it immediately all over luminous; though, when the moisture was dried up, the light was extinguished.

Abbé Nollet's theory

The abbé Nollet was much struck with the luminousness of the sea when he was at Venice in 1749; and, after taking a great deal of pains to ascertain the circumstances of it, concluded that it was occasioned by a shining insect; and having examined the water very often, he at length did find a small insect, which he particularly describes, and to which he attributes the light. The same hypothesis had also occurred to M. Vianelli, professor of medicine in Chioggia near Venice; and both he and M. Grizellini, a physician in Venice, have given drawings of the insects from which they imagined this light to proceed.

The abbé was the more confirmed in his hypothesis, by observing, some time after, the motion of some luminous particles in the sea. For, going into the water, and keeping his head just above the surface, he saw them dart from the bottom, which was covered with weeds, to the top, in a manner which he thought very much resembled the motions of insects; though, when he endeavoured to catch them, he only found some luminous spots upon his handkerchief, which were enlarged when he pressed them with his finger.

Observations of M. le Roi.

M. le Roi, making a voyage on the Mediterranean, presently after the abbé Nollet made his observations at Venice, took notice, that in the day time, the prow of the ship in motion threw up many small particles, which, falling upon the water, rolled upon the surface of the sea for a few seconds before they mixed with it; and in the night the same particles, as he concluded, had the appearance of fire. Taking a quantity of the water, the same small sparks appeared whenever it was agitated; but, as was observed with respect to Dr Beale's experiments, every successive agitation produced a less effect than the preceding, except after being suffered to rest a while; for then a fresh agitation would make it almost as luminous as the first. This water, he observed, would retain its property of shining by agitation a day or two; but it disappeared immediately on being set on the fire, though it was not made to boil. *Memoires Presentes*, vol. iii. 144.

This gentleman, after giving much attention to this phenomenon, concludes, that it is not occasioned by any

Light. any shining insects, as the abbé Nollet imagined; especially as, after carefully examining some of the luminous points, which he caught upon an handkerchief, he found them to be round like large pins heads, but with nothing of the appearance of any animal, though he viewed them with a microscope. He also found, that the mixture of a little spirit of wine with water just drawn from the sea, would give the appearance of a great number of little sparks, which would continue visible longer than those in the ocean. All the acids, and various other liquors, produced the same effect, though not quite so conspicuously; but no fresh agitation would make them luminous again. M. le Roi is far from asserting that there are no luminous insects in the sea. He even supposes that the abbé Nollet and M. Vianelli had found them. But he was satisfied that the sea is luminous chiefly on some other account, though he does not so much as advance a conjecture about what it is.

Experiments by M. Ant. Martin.

M. Ant. Martin made many experiments on the light of fishes, with a view to discover the cause of the light of the sea. He thought that he had reason to conclude, from a great variety of experiments, that all sea fishes have this property; but that it is not to be found in any that are produced in fresh water. Nothing depended upon the colour of the fishes, except that he thought that the white ones, and especially those that had white scales, were a little more luminous than others. This light, he found, was increased by a small quantity of salt; and also by a small degree of warmth, though a greater degree extinguished it. This agrees with another observation of his, that it depends entirely upon a kind of moisture which they had about them, and which a small degree of heat would expel, when an oiliness remained which did not give this light, but would burn in the fire. Light from the flesh of birds or beasts is not so bright, he says, as that which proceeds from fish. Human bodies, he says, have sometimes emitted light about the time that they began to putrefy, and the walls and roof of a place in which dead bodies had often been exposed, had a kind of dew or clamminess upon it, which was sometimes luminous; and he imagined that the lights which are said to be seen in burying-grounds may be owing to this cause.

Swed. Abhand. vol. xxiii. p. 225.

By Mr Canton.

From some experiments made by Mr Canton, he concludes, that the luminousness of sea water is owing to the slimy and other putrescent substances it contains. On the evening of the 14th of June 1768, he put a small fresh whiting into a gallon of sea water, in a pan which was about 14 inches in diameter, and took notice that neither the whiting nor the water, when agitated, gave any light. A Fahrenheit's thermometer, in the cellar where the pan was placed, stood at 54°. The 15th, at night, that part of the fish which was even with the surface of the water was luminous, but the water itself was dark. He drew the end of a stick through it, from one side of the pan to the other; and the water appeared luminous behind the stick all the way, but gave light only where it was disturbed. When all the water was stirred, the whole became luminous, and appeared like milk, giving a considerable degree of light to the sides of the pan; and it continued to do so for some time after it was at rest. The water was most luminous when the fish had been in it about 28 hours; but would not give any light by being stirred, after it had been in it three days. Light.

He then put a gallon of fresh water into one pan, and an equal quantity of sea water into another; and into each pan he put a fresh herring of about three ounces. The next night the whole surface of the sea water was luminous without being stirred; but it was much more so when it was put in motion; and the upper part of the herring, which was considerably below the surface of the water, was also very bright; while at the same time the fresh water, and the fish that was in it, were quite dark. There were several very bright luminous spots on different parts of the surface of the sea water; and the whole, when viewed by the light of a candle, seemed covered with a greasy scum. The third night, the light of the sea water, while at rest, was very little, if at all less than before; but when stirred, its light was so great as to discover the time by a watch, and the fish in it appeared as a dark substance. After this, its light was evidently decreasing, but was not quite gone before the 7th night. The fresh water and the fish in it were perfectly dark during the whole time. The thermometer was generally above 60°.

The preceding experiments were made with sea water: but he now made use of other water, into which he put common or sea salt, till he found, by an hydrometer, that it was of the same specific gravity with the sea water; and, at the same time, in another gallon of water, he dissolved two pounds of salt; and into each of these waters he put a small fresh herring. The next evening the whole surface of the artificial sea water was luminous without being stirred; but gave much more light when it was disturbed. It appeared exactly like the real sea water in the preceding experiment; its light lasted about the same time, and went off in the same manner: while the other water, which was almost as salt as it could be made, never gave any light. The herring which was taken out of it the seventh night, and washed from its salt, was found firm and sweet; but the other herring was very soft and putrid, much more so than that which had been kept as long in fresh water. If a herring, in warm weather, be put into 10 gallons of artificial sea water, instead of one, the water, he says, will still become luminous, but its light will not be so strong.

It appeared by some of the first observations on this subject, that *heat* extinguishes the light of putrescent substances. Mr Canton also attended to this circumstance; and observes, that though the greatest summer heat is well known to promote putrefaction, yet 20 degrees more than that of the human blood seems to hinder it. For putting a small piece of a luminous fish into a thin glass ball, he found, that water of the heat of 118 degrees would extinguish its light in less than half a minute; but that, on taking it out of the water, it would begin to recover its light in about 10 seconds; but it was never afterwards so bright as before.

Mr Canton made the same observation that Mr Ant. Martin had done, viz. that several kinds of river fish could not be made to give light, in the same circumstances in which any sea fish became luminous. He says, however, that a piece of carp made the water very luminous,

Light. luminous, though the outside, or scaly part of it, did not shine at all.

For the sake of those persons who may choose to repeat his experiments, he observes, that artificial sea water may be made without the use of an hydrometer, by the proportion of four ounces avoirdupois of salt to seven pints of water, wine measure.

A very elaborate paper on the subject by Dr Hulme appeared in the Philosophical Transactions for 1800, to which we refer our readers, and to CHEMISTRY, p. 451.

The ocean luminous from insects. From undoubted observations, however, it appears, that in many places of the ocean it is covered with luminous insects to a very considerable extent. M. Dagelet, a French astronomer who returned from the Terra Australis in the year 1774, brought with him several kinds of worms which shine in water when it is set in motion; and M. Rigaud, in a paper inserted (if we are not mistaken) in the Journal des Sçavans for the month of March 1770, affirms, that the luminous surface of the sea, from the port of Brest to the Antilles, contains an immense quantity of little, round, shining polypuses of about a quarter of a line in diameter. Other learned men, who acknowledge the existence of these luminous animals, cannot, however, be persuaded to consider them as the cause of all that light and scintillation that appear on the surface of the ocean: they think that some substance of the phosphorus kind, arising from putrefaction, must be admitted as one of the causes of this phenomenon. M. Godehoue has published curious observations on a kind of fish called in French *bonite*, already mentioned; and though he has observed, and accurately described, several of the luminous insects that are found in sea-water, he is, nevertheless, of opinion, that the scintillation and flaming light of the sea proceed from the oily and greasy substances with which it is impregnated.

The abbé Nollet was long of opinion, that the light of the sea proceeded from electricity (A); though he afterwards seemed inclined to think, that this phenomenon was caused by small animals, either by their luminous aspect, or at least by some liquor or effluvia which they emitted. He did not, however, exclude other causes; among these, the spawn or fry of fish deserves to be noticed. M. Dagelet, sailing into the bay of Antongil, in the island of Madagascar, observed a prodigious quantity of fry which covered the surface of the sea above a mile in length, and which he at first took for banks of sand on account of their colour; they exhaled a disagreeable odour, and the sea had appeared with uncommon splendour some days before. The same accurate observer, perceiving the sea remarkably luminous in the road of the Cape of Good Hope during a perfect calm, remarked, that the oars of the canoes produced a whitish and pearly kind of lustre; when he took in his hand the water which contained this phosphorus, he discerned in it, for some minutes, globules of light as large as the heads of pins. When he pressed these globules, they appeared to his touch like a soft and thin pulp; and some days after the sea was covered near the coasts with whole banks of these little fish in innumerable multitudes. Light.

To putrefaction, also, some are willing to attribute that luminous appearance which goes by the name of *ignis fatuus*, to which the credulous vulgar ascribe very extraordinary and especially mischievous powers. It is most frequently observed in boggy places and near rivers, though sometimes also in dry places. By its appearance benighted travellers are said to have been sometimes misled into marshy places, taking the light which they saw before them for a candle at a distance; from which seemingly mischievous property it has been thought by the vulgar to be a spirit of a malignant nature, and been named accordingly *Will with a wisp*, or *Jack with a lanthorn*; for the same reason also it probably had its Latin name *ignis fatuus*. *Ignis fatuus.*

This kind of light is said to be frequent about burying places and dunghills. Some countries are also remarkable for it, as about Bologna in Italy, and some parts of Spain and Ethiopia. Its forms are so uncertain and variable that they can scarce be described, especially as few philosophical observers ever had the good fortune to meet with it. Dr Derham, however, happened one night to perceive one of them, and got so near that he could have a very advantageous view of it. This is by no means easy to be obtained; for among other singularities of the *ignis fatuus*, it is observed to avoid the approach of any person, and fly from place to place as if it was animated. That which Dr Derham observed was in some boggy ground betwixt two rocky hills; and the night was dark and calm; by which means, probably, he was enabled to advance within two or three yards of it. It appeared like a complete body of light without any division, so that he was sure it could not be occasioned by insects, as some have supposed; the separate lights of which he could not have failed to distinguish, had it been occasioned by them. The light kept dancing about a dead thistle, till a very slight motion of the air, occasioned, as he supposed, by his near approach to it, made it jump to another place; after which it kept flying before him as he advanced. M. Beccaria endeavoured to procure all the intelligence he could concerning his phenomenon, by inquiring of all his acquaintance who might have had an opportunity of observing it. Thus he obtained information that two of these lights appeared in the plains about Bologna, the one to the north, and the other to the south, of that city, and were to be seen almost every dark night, especially that to the eastward, giving a light equal to an ordinary faggot. The latter appeared to a gentleman of his acquaintance as he was travelling; moved constantly before him for about a mile; and gave a better light than a torch which was carried before him. Both these appearances gave a very strong light, and were constantly in motion, though this various and uncertain. Sometimes they would rise, sometimes sink; but commonly they would hover about six feet from the ground; they would also frequently disappear on a sudden,

(A) This hypothesis was also maintained in a treatise published at Venice in 1746, by an officer in the Austrian service, under the title *Dell' Eletrecismo*.

Light. den, and appear again in some other place. They differed also in size and figure, sometimes spreading pretty wide, and then contracting themselves; sometimes breaking into two, and then joining again. Sometimes they would appear like waves, at others they would seem to drop sparks of fire: they were but little affected by the wind; and in wet and rainy weather were frequently observed to cast a stronger light than in dry weather: they were also observed more frequently when snow lay upon the ground, than in the hottest summer; but he was assured that there was not a dark night throughout the whole year in which they were not to be seen. The ground to the eastward of Bologna, where the largest of these appearances was observed, is a hard chalky soil mixed with clay, which will retain the moisture for a long time, but breaks and cracks in hot weather. On the mountains, where the soil is of a looser texture, and less capable of retaining moisture the *ignes fatui* were less.

From the best information which M. Beccaria was able to procure, he found that these lights were very frequent about rivers and brooks. He concludes his narrative with the following singular account: "An intelligent gentleman travelling in the evening, between eight and nine, in a mountainous road about ten miles south of Bologna, perceived a light which shone very strangely upon some stones which lay on the banks of the river Rioverde. It seemed to be about two feet above the stones, and not far from the water. In size and figure it had the appearance of a parallelopiped, somewhat more than a foot in length, and half a foot high, the longest side being parallel to the horizon. Its light was so strong, that he could plainly discern by it part of a neighbouring hedge and the water of the river; only in the east corner of it the light was rather faint, and the square figure less perfect, as if it was cut off or darkened by the segment of a circle. On examining it a little nearer, he was surprised to find that it changed gradually from a bright red, first to a yellowish, and then to a pale colour, in proportion as he drew nearer; and when he came to the place itself, it quite vanished. Upon this he stepped back, and not only saw it again, but found that the farther he went from it, the stronger and brighter it grew. When he examined the place of this luminous appearance, he could perceive no smell nor any other mark of fire." This account was confirmed by another gentleman, who informed M. Beccaria, that he had seen the same light five or six different times in spring and in autumn; and that it always appeared of the same shape, and in the very same place. One night in particular, he observed it come out of a neighbouring field to settle in the usual place.

A very remarkable account of an *ignis fatuus* is given by Dr Shaw in his Travels to the Holy Land. It appeared in the valleys of Mount Ephraim, and attended him and his company for more than an hour. Sometimes it would appear globular, or in the shape of the flame of a candle; at others it would spread to such a degree as to involve the whole company in a pale inoffensive light, then contract itself, and suddenly disappear; but in less than a minute would appear again; sometimes running swiftly along, it would expand itself at certain intervals over more than two or three acres of the adjacent mountains. The atmosphere from the beginning of the evening had been remarkably thick and hazy; and the dew, as they felt it on the bridles of their horses, was very clammy and unctuous. Light.

Lights resembling the *ignis fatuus* are sometimes observed at sea, skipping about the masts and rigging of ships; and Dr Shaw informs us, that he has seen these in such weather as that just mentioned when he saw the *ignis fatuus* in Palestine. Similar appearances have been observed in various other situations; and we are told of one which appeared about the bed of a woman in Milan, surrounding it as well as her body entirely. This light fled from the hand which approached it; but was at length entirely dispersed by the motion of the air. Of the same kind also, most probably, are those small luminous appearances which sometimes appear in houses or near them, called in Scotland *Elf-candles*, and which are supposed to portend the death of some person about the house. In general these lights are harmless, though not always; for we have accounts of some luminous vapours which would encompass stacks of hay and corn, and set them on fire; so that they became objects of great terror and concern to the country people. Of these it was observed, that they would avoid a drawn sword, or sharp-pointed iron instrument, and that they would be driven away by a great noise; both which methods were made use of to dissipate them: and it was likewise observed, that they came from some distance, as it were on purpose to do mischief.

Several philosophers have endeavoured to account for these appearances, but hitherto with no great success; nor indeed does there seem to be sufficient data for solving all their phenomena. Willoughby, Ray, and others, have imagined that the light was occasioned by a number of shining insects; but this opinion was never supported in such a manner as to gain much ground. The *ignis fatuus* seen by Dr Derham above mentioned, as well as all the other instances we have related, seem to demonstrate the contrary. Sir Isaac Newton calls it a vapour shining without heat; and supposes that there is the same difference between the vapour of *ignis fatuus* and flame, that there is between the shining of rotten wood and burning coals. But though this seems generally to be the case, there are still some exceptions, as has been instanced in the vapours which set fire to the stacks of corn. Dr Priestley supposes that the light is of the same nature with that produced by putrescent substances; and others are of opinion, that the electrical fluid is principally concerned; but none have attempted to give any particular solution of the phenomena.

From the frequent appearance of the *ignis fatuus* in marshes, moist ground, burying-places, and dunghills, we are naturally led to conclude, that putrefaction is concerned in the production of it. This process, we know, is attended with the emission of an aqueous steam, together with a quantity of fixed, inflammable, and azotic airs, all blended together in the form of vapour. It is likewise attended with some degree of heat; and we know that there are some vapours, that of sulphur particularly, which become luminous, with a degree of heat much less than that sufficient to set fire to combustible bodies. There is no inconsistency, therefore, in supposing that the putrid

vapour

Light. vapour may be capable of shining with a still smaller degree of heat than that of sulphur, and consequently become luminous by that which putrefaction alone affords. This would account for the *ignis fatuus*, were it only a steady luminous vapour arising from places where putrid matters are contained; but its extreme mobility, and flying from one place to another on the approach of any person, cannot be accounted for on this principle. If one quantity of the putrid vapour becomes luminous by means of heat, all the rest ought to do so likewise; so that, though we may allow heat and putrefaction to be concerned, yet of necessity we must have recourse to some other agent, which cannot be any other but electricity. Without this, it is impossible to conceive how any body of moveable vapour should not be carried away by the wind; but so far is this from being the case, that the *ignes fatui*, described by M. Beccaria, were but little affected by the wind. It is besides proved by undoubted experiment, that electricity always is attended with some degree of heat; and this, however small, may be sufficient to give a luminous property to any vapour on which it acts strongly; not to mention, that the electric fluid itself is no other than that of light, and may therefore by its action easily produce a luminous appearance independent of any vapour.

We have a strong proof that electricity is concerned, or indeed the principal agent, in producing the *ignis fatuus*, from an experiment related by Dr Priestley of a flame of this kind being artificially produced. A gentleman, who had been making many electrical experiments for a whole afternoon in a small room, on going out of it, observed a flame following him at some little distance. This, we have no reason to doubt, was a true *ignis fatuus*, and the circumstances necessary to produce it were then present, viz. an atmosphere impregnated with animal vapour, and likewise strongly electrified. Both these circumstances undoubtedly must have taken place in the present case; for the quantity of perspiration emitted by a human body is by no means inconsiderable; and it, as well as the electricity, would be collected by reason of the smallness of the room. In this case, however, there seems to have been a considerable difference between the artificial *ignis fatuus* and those commonly met with; for this flame *followed* the gentleman as he went out of the room; but the natural ones commonly fly from those who approach them. This may be accounted for, from a difference between the electricity of the atmosphere in the one room and the other; in which case the flame would naturally be attracted towards that place where the electricity was either different in quality or in quantity; but in the natural way, where all bodies may be supposed equally electrified for a great way round, a repulsion will as naturally take place. Still, however, this does not seem to be always the case. In those instances where travellers have been attended by an *ignis fatuus*, we cannot suppose it to have been influenced by any other power than what we call *attraction*, and which electricity is very capable of producing. Its keeping at some distance is likewise easily accounted for; as we know that bodies possessed of different quantities of electricity may be made to attract one another for a certain space, and then repel without having ever come into contact. On this principle we may account for the light which surrounded the woman at Milan, but fled from the hand of any other person. On the same principle may we account for these mischievous vapours which set fire to the hay and corn stacks, but were driven away by presenting to them a pointed iron instrument, or by making a noise. Both these are known to have a great effect upon the electric matter; and by means of either, even lightning may occasionally be made to fall upon or to avoid particular places, according to the circumstances by which the general mass happens to be affected at that time. Light.

On the whole, therefore, it seems most probable, that the *ignis fatuus* is a collection of vapour of the putrescent kind, very much affected by electricity; according to the degree of which, it will either give a weak or strong light, or even set fire to certain substances disposed to receive its operation. This opinion seems greatly to be confirmed from some luminous appearances observed in privies, where the putrid vapours have even collected themselves into balls, and exploded violently on the approach of a candle. This last effect, however, we cannot so well ascribe to the electricity, as to the accension of the inflammable air which frequently abounds in such places.

In the appendix to Dr Priestley's third volume of Experiments and Observations on Air, Mr Warltire gives an account of some very remarkable *ignes fatui*, which he observed on the road to Bromsgrove, about five miles from Birmingham. The time of observation was the 12th of December 1776, before day-light. A great many of these lights were playing in an adjacent field, in different directions; from some of which there suddenly sprung up bright branches of light, something resembling the explosion of a rocket that contained many brilliant stars, if the discharge was upwards, instead of the usual direction; and the hedge and trees on each side of the hedge were illuminated. This appearance continued but a few seconds, and then the jack-a-lanterns played as before. Mr Warltire was not near enough to observe if the apparent explosions were attended with any report.

Cronstedt gives it as his opinion, that *ignis fatuus*, as well as the meteors called *falling stars*, are owing to collections of inflammable air raised to a great height in the atmosphere. But, with regard to the latter, the vast height at which they move evidently shows that they cannot be the effect of any *gravitating* vapour whatever; for the lightest inflammable air is one-twelfth of that of the common atmosphere: and we have no reason to believe, that at the distance of 40 or 50 miles from the earth, the latter has near one-twelfth of its weight at the surface. From the account given by Mr Warltire, we should be apt to conclude, that there is a strong affinity betwixt the *ignes fatui* and fire balls, insomuch that the one might be very easily converted into the other. From this then we must ascribe an electrical origin to the one as well as the other. Electricity, we know, can assume both these appearances, as is evident in the case of points; or even when the atmosphere is violently electrified, as around the string of an electrical kite, which always will appear to be surrounded with a blue flame in the night, if the electricity be very strong.

On the whole, it appears, that electricity acting upon

Light. on a small quantity of atmospherical air, with a certain degree of vigour, will produce an appearance resembling an *ignis fatuus;* with a superior force it will produce a fire ball; and a sudden increase of electrical power might produce those sparks and apparent explosions, observed by Mr Warltire. The only difficulty therefore is, Why does electricity exert its power upon one portion of the atmosphere rather than another, seeing it has an opportunity of diffusing itself equally through the whole? To this it seems impossible to give any other reason than that we see the fact is so; and that in all cases where there is a quantity of electrified air or vapour, there will be an accumulation in one part rather than another. Thus, in the experiment already related, where the gentleman perceived a blue flame following him, the whole air of the room was electrified, but the greatest power of the fluid was exerted on that which gave the luminous appearance.

With regard to the uses of the *ignes fatui* in the system of nature, we can only say, that they seem to be accidental appearances resulting from the motion of the electric fluid, and, no doubt, like other meteors, subservient to the preservation of its equilibrium, and thus are useful in preventing those dreadful commotions which ensue when a proper medium for so doing is deficient.

Phosphoric light. A light in some respects similar to those above mentioned has been found to proceed from that celebrated chemical production called *phosphorus*, which always tends to decompose itself, so as to take fire by the access of *air* only. Phosphorus, therefore, when it emits light, is properly a body ignited; though when a very small quantity of it is used, as what is left after drawing it over paper, or what may be dissolved in essential oil, the heat is not sensible. But perhaps the matter which emits the light in what we call *putrescent substances* may be similar to it, though it be generated by a different process, and burn with a less degree of heat. Putrescence does not seem to be necessary to the light of glow-worms or of the pholades; and yet their light is sufficiently similar to that of shining wood or flesh. Electric light is unquestionably similar to that of phosphorus, though the source of it is apparently very different.

Kunckel formed his phosphorus into a kind of pills about the size of peas, which being moistened a little, and scraped in the dark, yielded a very considerable light, but not without smoke. The light was much more pleasing when eight or ten of these pills were put into a glass of water; for being shaken in the dark, the whole glass seemed to be filled with light. Kunckel also reduced his phosphorus into the form of larger stones; which being warmed by a person's hand, and rubbed upon paper, would describe letters that were very legible in the dark.

The greatest variety of experiments with the light of phosphorus was made by Dr Slare, who says, that the liquid phosphorus (which is nothing more than the solid phosphorus dissolved in any of the essential oils) would not hurt even a lady's hand; or that, when the hands or face were washed with it, it would not only make them visible to other persons in the dark, but that the light was so considerable as to make other neighbouring objects visible.

When the solid phosphorus is quite immersed in water, he observes that it ceases to shine; but that if any part of it chance to emerge, or get into the air, it will shine though the glass be hermetically sealed. In a large glass he kept it without water for several days; and yet it continued shining, with very little diminution of its light or weight. If the letters that were written with this phosphorus were warmed by the fire, they presently became dark lines, which continued upon the paper, like ink. To try how much light was given by a small quantity of this phosphorus, he observed that it continued to flame in the open air for seven or eight days; the light being visible whenever he shut his window.

As air was generally thought to contain the *pabulum* of flame, Dr Slare was determined to try this with respect to phosphorus; and for this purpose he placed a large piece of it in a receiver; but upon exhausting it, he perceived that it became more luminous, and that, upon admitting the air, it returned to its former state. This property of the light of phosphorus, which is the very reverse of that of shining wood and fishes, was also ascertained by several very accurate experiments of Mr Hauksbee's.

Endeavouring to blow the phosphorus into a flame with a pair of bellows, Dr Slare found that it was presently blown out, and that it was a considerable time before the light revived again. All liquors would extinguish this light when the phosphorus was put into them; nor would it shine or burn, though it was even boiled in the most inflammable liquors, as oil of olives, spirit of turpentine, or even spirit of wine.

In order to keep his phosphorus from consuming, he used to put it in a glass of water; and sometimes he has seen it, when thus immersed in water, make such bright and vigorous coruscations in the air, as, he says, would surprise and frighten those who are not used to the phenomenon. This fiery meteor, he says, is contracted in its passage through the water, but expands as soon as it gets above it. If any person would make this experiment to advantage, he informs them that the glass must be deep and cylindrical, and not above three quarters filled with water. This effect he perceived in warm weather only, and never in cold.

The phosphorus of which we have been treating is prepared from urine; but in some cases the sweat, which is similar to urine, has been observed to be phosphoraceous, without any preparation. This once happened to a person who used to eat great quantities of salt, and who was a little subject to the gout, after sweating with violent exercise. Stripping himself in the dark, his shirt seemed to be all on fire, which surprised him very much. Upon examination, red spots were found upon his shirt; and the physician who was present perceived an urinous smell, though it had nothing in it of volatile alkali, but of the muriatic acid. the same, he says, that issues from cabbage much salted, and strongly fermented. *Acta Cæsariana*, vol. v. p. 354.

The easiest method of accounting for all these kinds of lights, perhaps, is from electricity. If light consists in a certain vibration of the electric fluid *, then it follows, that in whatever substances such a vibration takes place, their light must appear, whether in putrescent animal substances, sea water, phosphorus, or any thing else. We know that the electric matter pervades all terrestrial All these lights accounted for from electricity. * See *Electricity*.

Light. terrestrial substances, and is very liable to be set in motion from causes of which we are ignorant. The action of the air by which putrefaction is produced may be one of these causes; and it can by no means appear surprising that the electric matter should act in the bodies of living animals in such a manner as to produce a permanent light, when we certainly know it acts in some of them so powerfully as to produce a shock similar to that of a charged phial.——On this subject we shall only observe farther, that when this vibration becomes so powerful as to penetrate the solid substance of the body itself, the luminous body then becomes transparent, as in the milk mentioned in the former part of this article; but when it is only superficial, the body, though it emits light, is itself opaque.

Light from Diamonds. Among luminous bodies the diamond is to be reckoned; as some diamonds are known to shine in the dark. But on account of the feebleness of their splendour, it is necessary for the person who is to observe them, previously to stay in the dark at least a quarter of an hour; that the pupil of the eye may be dilated and enlarged, and so rendered capable of receiving a large quantity of the rays of light. M. du Fay has also observed, that the eyes ought to be shut for this time, or at least one of them; and that, in that case, the light of the diamond is afterwards only seen by that eye which has been shut. Before the diamond is brought into the dark room, it must be exposed to the sunshine, or at least to the open daylight, to imbibe a sufficient quantity of rays; and this is done in one minute, or even less; eight or ten seconds having been found to furnish as much light as a stone is capable of receiving: and when brought into the dark, its light continues about twelve or thirteen minutes, weakening all the while by insensible degrees. It is very remarkable, that in bodies so extremely similar to each other as diamonds are, some should have this property of imbibing the sun's rays, and shining in the dark, and that others should not; yet so it is found to be by experiment, and the most nearly resembling stones shall be found one to have this property, and another to be destitute of it; while many of the most dissimilar have the property in common. There seems to be no rule, nor even the least traces of any imperfect rule of judging, which diamonds have, and which have not this property; their natural brightness, their purity, their size, or their shape, contribute nothing to it: and all that has been yet discovered of the least regularity among them, is, that all yellow diamonds have this property. This is supposed to arise from their having more sulphur in their composition, and therefore illuminating more readily, or emitting a more visible flame.

The burning of diamonds is a term used among the jewellers, for putting them into a fierce fire, as they frequently do, when they are fouled with brown, or yellow, or the like; this always divests them of their colour, without doing them the least sensible injury. M. du Fay, having been informed of this common practice, formed a conjecture, that the difference of diamonds in their shining or not shining in the dark, was owing to it; and that either all those which had been burnt, or all those which had not, were those which alone shone in the dark. But this was found an erroneous conjecture; for two diamonds, one lucid in the dark, the other not, were both burnt, and afterwards both were found to retain the same properties they had before. It is not only the open sunshine, or open daylight, which gives to these diamonds the power of shining in the dark; they receive it in the same manner even if laid under a glass, or plunged in water or in milk. Light.

M. du Fay tried whether it was possible to make the diamond retain, for any longer time, the light it naturally parts with so soon; and found, that if the diamond, after being exposed to the light, be covered with black wax, it will shine in the dark, as well six hours afterwards as at the time it was first impregnated with the light.

The imbibing light, in this manner, being so nice a property as not to be found in several diamonds, it was not to be supposed that it would be found in any other stones: accordingly, on trial, the ruby, the sapphire, and the topaz, were found wholly destitute of it; and among a large number of rough emeralds, one only was found to possess it. Such is the strange uncertainty of these accidents.

All the other less precious stones were tried, and found not to possess this property of imbibing light from the daylight or sunshine, but they all became luminous by the different means of heating or friction; with this difference, that some acquired it by one of these methods, and others by the other; each being unaffected by that which gave the property to the other. The diamond becomes luminous by all these ways.

Beccarius also discovered, that diamonds have the property of the Bolognian phosphorus, about the same time that it occurred to M. du Fay. *Com. Bonon.* vol. ii. p. 276. M. du Fay likewise observed, that the common topaz, when calcined, had all the properties of this phosphorus; and pursuing the discovery, he found the same property in a great degree, in the belemnites, gypsum, limestone, and marble: though he was obliged to dissolve some very hard substances of this kind in acids, before calcination could produce this change in them; and with some substances he could not succeed even thus; especially with flint stones, river sand, jaspers, agates, and rock crystal.

Light from Plants. In Sweden a very curious phenomenon has been observed on certain flowers by M. Haggern, lecturer in natural history. One evening he perceived a faint flash of light repeatedly dart from a marigold. Surprised at such an uncommon appearance, he resolved to examine it with attention; and, to be assured it was no deception of the eye, he placed a man near him, with orders to make a signal at the moment when he observed the light. They both saw it constantly at the same moment.

The light was most brilliant on marigolds of an orange or flame colour; but scarcely visible on pale ones.

The flash was frequently seen on the same flower two or three times in quick succession; but more commonly at intervals of several minutes: and when several flowers in the same place emitted their light together, it could be observed at a considerable distance.

This phenomenon was remarked in the months of July and August at sunset, and for half an hour, when the atmosphere was clear; but after a rainy day, or

when

Light || Light-House.

when the air was loaded with vapours, nothing of it was seen.

The following flowers emitted flashes, more or less vivid, in this order:

1. The marigold, *calendula officinalis*.
2. Monkshood, *tropæolum majus*.
3. The orange lily, *lilium bulbiferum*.
4. The Indian pink, *tagetes patula et erecta*.

To discover whether some little insects or phosphoric worms might not be the cause of it, the flowers were carefully examined, even with a microscope, without any such thing being found.

From the rapidity of the flash, and other circumstances, it may be conjectured that there is something of electricity in this phenomenon. It is well known, that when the pistil of a flower is impregnated, the pollen bursts away by its elasticity, with which electricity may be combined. But M. Haggern, after having observed the flash from the orange lily, the antheræ of which are a considerable space distant from the petals, found that the light proceeded from the petals only; whence he concludes, that this electric light is caused by the pollen, which, in flying off, is scattered on the petals. Whatever be the cause, the effect is singular and highly curious.

LIGHTS, in *Painting*, are those parts of a piece which are illuminated, or that lie open to the luminary by which the piece is supposed to be enlightened; and which, for this reason, are painted in bright vivid colours.

In this sense light is opposed to shadow.

Different lights have very different effects on a picture, and occasion a difference in the management of every part. A great deal therefore depends on the painter's choosing a proper light for his piece to be illuminated by; and a great deal more, in the conduct of the lights and shadows, when the luminary is pitched upon.

The strength and relievo of a figure, as well as its gracefulness, depend entirely upon the management of the lights, and the joining of those to the shadows.

The light a figure receives is either direct or reflected; to each of which special regard must be had. The doctrine of lights and shadows makes that part of painting called *clair-obscure*.

LIGHT-Horse, an ancient term in our English customs, signifying an ordinary cavalier or horseman lightly armed, and so as to enter a corps or regiment; in opposition to the men-at-arms, who were heavily accoutred, and armed at all points. See *Light-Horse*.

LIGHT-House, a building erected upon a cape or promontory on the sea-coast, or upon some rock in the sea, and having on its top in the night-time a great fire, or light formed by candles, which is constantly attended by some careful person, so as to be seen at a great distance from the land. It is used to direct the shipping on the coast, that might otherwise run ashore, or steer an improper course, when the darkness of the night and the uncertainty of currents, &c. might render their situation with regard to the shore extremely doubtful. Lamp-lights are, on many accounts, preferable to coal fires or candles; and the effect of these may be increased by placing them either behind glass hemispheres, or before properly disposed glass or metal reflectors, which last method is now very generally adopted. See BEACONS.

Light-House || Lightfoot.

LIGHT-Room, a small apartment, enclosed with glass windows, near the magazine of a ship of war. It is used to contain the lights by which the gunner and his assistants are enabled to fill cartridges with powder to be ready for action.

LIGHTER, a large, open, flat-bottomed vessel, generally managed with oars, and employed to carry goods to or from a ship when she is to be laden or delivered.—There are also some lighters furnished with a deck throughout their whole length, in order to contain those merchandises which would be damaged by rainy weather: these are usually called *close lighters*.

LIGHTFOOT, JOHN, a most learned English divine, was the son of a divine, and born in March 1602, at Stoke upon Trent in Staffordshire. After having finished his studies at a school on Morton-green near Congleton in Cheshire, he was removed in 1617 to Cambridge, where he applied himself to eloquence, and succeeded so well in it as to be thought the best orator of the under graduates in the university. He also made an extraordinary proficiency in the Latin and Greek; but neglected the Hebrew, and even lost that knowledge he brought of it from school. His taste for the oriental languages was not yet excited; and as for logic, the study of it as managed at that time among the academics, was too quarrelsome and fierce for his quiet and meek disposition. As soon as he had taken the degree of B. A. he left the university, and became assistant to a school at Repton in Derbyshire. After he had supplied this place a year or two, he entered into orders, and became curate of Norton under Hales in Shropshire. This curacy gave an occasion of awakening his genius for the Hebrew tongue. Norton lies near Bellaport, then the seat of Sir Rowland Cotton; who was his constant hearer, made him his chaplain, and took him into his house. This gentleman, being a perfect master of the Hebrew language, engaged Lightfoot in that study; who, by conversing with his patron, soon became sensible, that without that knowledge it was impossible to attain an accurate understanding of the scriptures. He therefore applied himself to it with extraordinary vigour, and in a little time made a great progress in it: and his patron removing with his family to reside in London, at the request of Sir Alland Cotton his uncle, who was lord-mayor of that city, he followed his preceptor thither. But he did not stay long there: for, having a mind to improve himself by travelling abroad, he went down into Staffordshire, to take leave of his father and mother. Passing through Stone in that county, he found the place destitute of a minister: and the pressing instances of the parishioners prevailed upon him to undertake that cure. Hereupon, laying aside his design of travelling abroad, he began to turn his thoughts upon settling at home. During his residence at Bellaport, he had fallen into the acquaintance of a gentlewoman who was daughter of William Crompton of Stonepark, Esq. and now, being in possession of that living, he married her in 1628. But notwithstanding this settlement, his unquenchable thirst after rabbinical learning would not suffer him to continue there. Sion-college library at London, he knew,

Lightfoot. was well stocked with books of that kind. He therefore quitted his charge at Stone, and removed with his family to Hornsey, near the city; where he gave the public a notable specimen of his advancement in those studies, by his "Erubbim, or Miscellanies Christian and Judaical," in 1629. He was at this time only 27 years of age; and appears to have been well acquainted with the Latin and the Greek fathers, as well as the ancient heathen writers. These first fruits of his studies were dedicated to Sir Rowland Cotton; who, in 1631, presented him to the rectory of Ashley in Staffordshire.

He seemed now to be fixed for life: Accordingly, he built a study in the garden, to be out of the noise of the house; and applied himself with indefatigable diligence in searching the scriptures. Thus employed, the days passed very agreeably; and he continued quiet and unmolested, till the great change which happened in the public affairs brought him into a share of the administration relating to the church; for he was nominated a member of the memorable assembly of divines for settling a new form of ecclesiastical polity. This appointment was purely the effect of his distinguished merit; and he accepted it purely with a view to serve his country, as far as lay in his power. The non-residence which this would necessarily occasion, apparently induced him to resign his rectory: and having obtained the presentation for a younger brother, he set out for London in 1642. He had now satisfied himself in clearing up many of the abstrusest passages in the Bible, and therein had provided the chief materials, as well as formed the plan, of his "Harmony;" and an opportunity of inspecting it at the press was, no doubt, an additional motive for his going to the capital: where he had not been long before he was chosen minister of St Bartholomew's, behind the Royal Exchange. The assembly of divines meeting in 1643, our author gave his attendance diligently there, and made a distinguished figure in their debates; where he used great freedom, and gave signal proofs of his courage as well as learning, in opposing many of those tenets which the divines were endeavouring to establish. His learning recommended him to the parliament, whose visitors, having ejected Dr William Spurstow from the mastership of Catharine-hall in Cambridge, put Lightfoot in his room, this year 1653; and he was also presented to the living of Much-Munden in Hertfordshire, void by the death of Dr Samuel Ward, Margaret-professor of divinity in that university, before the expiration of this year. Meanwhile he had his turn with other favourites in preaching before the house of commons, most of which sermons were printed; and in them we see him warmly pressing the speedy settlement of the church in the Presbyterian form, which he cordially believed to be according to the pattern in the Mount. He was all the while employed in preparing and publishing the several branches of his Harmony; all which were so many excellent specimens of the usefulness of human learning to true religion: and he met with great difficulties and discouragements in that work, chiefly from that anticruditional spirit which prevailed, and even threatened the destruction of the universities. In 1655 he entered upon the office of vice-chancellor of Cambridge, to which he was chosen that year, having taken the degree of doctor of divinity in 1652. He performed all the regular exercises for his degree with great applause, and executed the vice-chancellor's office with exemplary diligence and fidelity; and, particularly at the commencement, supplied the place of professor of divinity, then undisposed of, as an act which was kept for a doctor's degree in that profession. At the same time he was engaged with others in perfecting the Polyglott Bible, then in the press. At the Restoration he offered to resign the mastership of Catharine-hall: But, as what he had done had been rather in compliance with the necessity of the times than from any zeal or spirit of opposition to the king and government, a confirmation was granted him from the crown, both of the place and of his living. Soon after this he was appointed one of the assistants at the conference upon the liturgy, which was held in the beginning of 1661, but attended only once or twice; probably disgusted at the heat with which that conference was managed. However, he stuck close to his design of perfecting his Harmony: and being of a strong and healthy constitution, which was assisted by an exact temperance, he prosecuted his studies with unabated vigour to the last, and continued to publish, notwithstanding the many difficulties he met with from the expence of it. However, not long before he died, some booksellers got a promise from him to collect and methodise his works, in order to print them; but the execution was prevented by his death, which happened December 6. 1675. The doctor was twice married: his first wife, already mentioned, brought him four sons and two daughters. His second wife was likewise a widow, and relict of Mr Austin Brograve, uncle of Sir Thomas Brograve, Bart. of Hertfordshire, a gentleman well versed in rabbinical learning, and a particular acquaintance of our author. He had no issue by her. She also died before him, and was buried in Munden church; where the doctor was himself likewise interred near both his wives. Dr Lightfoot's works were collected and published first in 1684, in two volumes folio. The second edition was printed at Amsterdam, 1686, in two volumes folio, containing all his Latin writings, with a Latin translation of those which he wrote in English. At the end of both these editions there is a list of such pieces as he left unfinished. It is the chief of these, in Latin, which make up the third volume, added to the former two, in a third edition of his works, by John Leusden, at Utrecht, in 1699, folio. They were communicated by Mr Strype, who, in 1700, published another collection of these papers, under the title of "Some genuine remains of the late pious and learned Dr John Lightfoot."

Lightfoot, Lighting.

LIGHTING of Streets. This invention, which is generally considered as of modern date, contributes greatly to the convenience and safety of the inhabitants of large cities, as well as to the ornament of their streets. It is not probable that the streets of ancient Rome were lighted, since the Romans considered the use of flambeaux and lanterns to be so necessary in returning home from their nocturnal visits. It appears that such as walked the streets without these went home in darkness; and the return of Cito in the night-time, of which Petronius makes mention, clearly proves that the streets of Naples were not lighted. Such as have ascribed a remote antiquity to the lighting of streets,

seem

Lighting. seem to have mistaken it for what are called illuminations, which indeed are of great antiquity. Egyptians, Jews, Greeks, and Romans, during the celebration of memorable festivals, were in the habit of illuminating their houses; but this is entirely different from the practice which we are now considering.

Paris was probably the first city in modern times, the streets of which were lighted, about the beginning of the 16th century, as they were very much infested by robbers and incendiaries. This occasioned an edict, issued in 1524, commanding the inhabitants, whose windows fronted the street, to keep lights burning after nine o'clock at night. In 1558, these were changed for lanterns, of a similar construction with those used at present. In 1671, the lanterns were ordered to be lighted every year from the 20th October to the end of March the ensuing year. Some time after this a premium was offered for a dissertation on the best means of improving the lighting of the streets, when a journeyman glazier obtained a premium of 200 livres, and Messrs Bailly, le Roy, and Bourgeois de Chateaublanc, 2000 livres. The lamps of Paris amounted to 5772 in the year 1721, and, in 1771, to 6232. The city of Nantz was lighted in 1777, and had no fewer than 500 lamps in the year 1780.

The inhabitants of the city of London were ordered, in 1688, to hang out lanterns duly at the accustomed time, which was renewed in 1690; and in 1716 it was enacted, that all those whose houses fronted any street, lane, or public passage, should hang out one or more lights, which were to burn from 6 o'clock to 11. By another act, the lamps were increased from 1000 to 4769, and afterwards to 5000. But as these were confined to the city and liberties, about one-fifth of the whole of London, the number of lamps could not be less than 15,000. The continuance of their burning was also increased from 750 to 5000 hours. In 1744, another act was obtained to regulate still farther the lighting of the city, and it was placed on the footing on which it stands at present. These are now so numerous, that Oxford street alone is said to contain more lamps than the whole city of Paris. Birmingham was lighted for the first time in 1733, with 700 lamps.

In 1669, Amsterdam was lighted by lanterns; the Hague in 1553 was lighted in a particular manner, but lamps were not fixed up in all the streets till the year 1678. The streets of Copenhagen were lighted in 1681, the plan of which was much improved in 1683. Berlin at present has 2354 lamps, kept lighted from September to May, at the expence of the sovereign. Vienna began to be lighted in 1687, and lamps were introduced in 1704. In 1776 their number amounted to 2000, which was increased to 3000, to be lighted at the annual expence of 30,000 florins. Leipzig was lighted in 1702, Dresden in 1705, Cassel in 1721, and Gottingen in 1735. A practice so beneficial to the safety and convenience of mankind, has been very laudably imitated by almost every city and town in Europe. *Beckman. Hist. of Invent.*

By far the greatest improvement that has been made in the lighting of cities, is the application of coal gas to this purpose. Gas lights were used so far back as 1792, but they were not employed for lighting streets till 1811. In 1818 they were first used to a limited extent in the streets of Edinburgh. The light the gas gives is much more powerful and steady than is given by oil, and on a large scale it is also more economical. See Gas Lights, *Supplement*. Lighting || Lignum Rhodium.

LIGHTNING, a bright and vivid flash of fire, suddenly appearing in the atmosphere, and commonly disappearing in an instant, sometimes attended with clouds and thunder, and sometimes not. For an account of the phenomena of lightning, and of the opinions concerning it, see Electricity *Index*.

Artificial Lightning. Before the discoveries of Dr Franklin concerning the identity of electricity and lightning, many contrivances were invented in order to represent this terrifying phenomenon in miniature: the coruscations of phosphorus in warm weather, the accension of the vapour of spirit of wine evaporated in a close place, &c. were used in order to support the hypothesis which at that time prevailed; namely, that lightning was formed of some sulphureous, nitrous, or other combustible vapours, floating in long trains in the atmosphere, which by some unaccountable means took fire, and produced all the destructive effects of that phenomenon. These representations, however, are now no more exhibited; and the only true artificial lightning is universally acknowledged to be the discharge of electric matter from bodies in which it is artificially set in motion by machines.

Lightning was looked upon as sacred both by the Greeks and Romans, and was supposed to be sent to execute vengeance on the earth: Hence persons killed with lightning, being thought hateful to the gods, were buried apart by themselves, lest the ashes of other men should receive pollution from them. Some say they were interred upon the very spot where they died; others will have it that they had no interment, but were suffered to rot where they fell, because it was unlawful for any man to approach the place. For this reason the ground was hedged in, lest any person unawares should contract pollution from it. All places struck with lightning were carefully avoided and fenced round, out of an opinion that Jupiter had either taken offence at them, and fixed upon them the marks of his displeasure, or that he had, by this means, pitched upon them as sacred to himself. The ground thus fenced about was called by the Romans *bidentul*. Lightning was much observed in augury, and was a good or bad omen, according to the circumstances attending it.

LIGNICENCIS terra, in the *Materia Medica*, the name of a fine yellow bole found in many parts of Germany, particularly about Emeric in the circle of Westphalia, and used as an astringent.

LIGNUM vitæ. See Guaiacum, Botany and Materia Medica *Index*.

Lignum Aloes. See Excoecaria, Botany *Index*.

Lignum Nephriticum. See Guilandina, Botany *Index*.

Lignum Rhodium, or *Rosewood*, in the *Materia Medica*; a wood, or root, chiefly brought from the Canary islands.

The taste of this wood is lightly bitterish, and somewhat pungent; its smell is very fragrant, resembling that

Lignum Rhodium || Lilburne.

that of roses: long kept, it seems to lose its smell; but on cutting, or rubbing one piece against the other, it smells as well as at first. Distilled with water, it yields an odoriferous essential oil, in very small quantity. Rhodium is at present in esteem only upon account of its oil, which is employed as a high and agreeable perfume.

Lignum Campechense. See Hematoxylum, Botany *Index*.

Lignum Colubrinum. See Ophiorhiza.

LIGULATED, among botanists, an appellation given to such floscules as have a straight end turned downwards, with three indentures, but not separated into segments.

LIGURIA, in *Ancient Geography*, a country of Italy, bounded on the south by the Mediterranean sea, on the north by the Apennine mountains, on the west by part of Transalpine Gaul, and on the east by Etruria. There is a great disagreement among authors concerning the origin of the Ligurians, though most probably they were descended from the Gauls. Some carry up their origin as far as the fabulous heroes of antiquity; while others trace them from the Ligyes, a people mentioned by Herodotus as attending Xerxes in his expeditions against Greece. These Ligyes are by some ancient geographers placed in Colchis; by others in Albania.—According to Diodorus Sieulus, the Ligurians led a very wretched life; their country being entirely overgrown with woods, which they were obliged to pull up by the root, in order to cultivate their land, which was also encumbered with great stones, and, being naturally barren, made but very poor returns for all their labour. They were much addicted to hunting; and, by a life of continual exercise and labour, became so strong, that the weakest Ligurian was generally an overmatch for the strongest and most robust among the Gauls. The women are said to have been almost as strong as the men, and to have borne an equal share in all laborious enterprises. With all their bravery, however, they were not able to resist the Roman power; but were subdued by that warlike nation about 211 B. C.

LIGUSTICUM, Lovage; a genus of plants belonging to the pentandria class; and in the natural method ranking under the 45th order, *Umbellatæ*. See Botany *Index*.

LIGUSTRUM, Privet; a genus of plants belonging to the diandria class; and in the natural method ranking under the 44th order, *Sepiariæ*. See Botany *Index*.

LILBURNE, John, an enthusiastic demagogue, who was tyrannically punished by the star-chamber court, being put in the pillory, whipped, fined, and imprisoned, for importing and publishing seditious pamphlets, which he had got printed in Holland; they chiefly reflected on the church of England and its bishops. He suffered in 1637, and in prison was doubly loaded with irons. In 1641, he was released by the long parliament; and from this time he had the address to make himself formidable to all parties, by his bold, aspiring genius. He signalized himself in the parliament army; and was at one time the secret friend and confidant of Cromwell, and at another his avowed enemy and accuser; so that, in 1650, Cromwell found it to be his interest to silence him, by a grant of some forfeited estates. But after this, he grew outrageous against the protector's government; became chief of the levellers; and was twice tried for high treason, but acquitted by the juries. The last was for returning from exile (having been banished by the parliament) without a pass. He died in 1657, aged 88.

Lilburne || Lilly.

LILIACEOUS, in *Botany*, an appellation given to such flowers as resemble those of the lily.

LILIUM, the Lily; a genus of plants belonging to the hexandria class; and in the natural method ranking under the 10th order, *Coronariæ*. See Botany *Index*.

LILLO, George, an excellent dramatic writer, was born at London in 1693. He was a jeweller by profession, and followed his business for many years in that neighbourhood with the fairest reputation. He was at the same time strongly attached to the muses, yet seemed to have laid it down as a maxim, that the devotion paid to them ought always to tend to the promotion of virtue, morality, and religion. In pursuance of this aim, Lilly was happy in the choice of his subjects, and showed great power of affecting the heart, by working up the passions to such a height as to render the distresses of common and domestic life equally interesting to the audiences as that of kings and heroes, and the ruin brought on private families by an indulgence of avarice, lust, &c. as the havock made in states and empires by ambition, cruelty, or tyranny. His "George Barnwell," "Fatal Curiosity," and "Arden of Feversham," are all planned on common and well known stories; yet they have perhaps more frequently drawn tears from an audience than the more pompous tragedies of Alexander the Great, All for Love, &c. In the prologue to "Elmeric," which was not acted till after the author's death, it is said, that when he wrote that play, he "was depressed by want," and afflicted by disease; but in the former particular there appears to be evidently a mistake, as he died possessed of an estate of 60l. a-year, besides other effects to a considerable value. His death happened in 1739, in the 47th year of his age. His works have been collected, and published, with an account of his life, in 2 vols 12mo.

LILLY, John, a dramatic poet, was born in the Wealds of Kent, about the year 1553, and educated in Magdalen-college, Oxford, where he took the degree of bachelor of arts in 1573, and that of master in 1575. From Oxford he removed to Cambridge; but how long he continued there is uncertain. On his arrival in London, he became acquainted with some of Queen Elizabeth's courtiers, by whom he was caressed, and admired as a poet and a wit; and her majesty, on particular festivals, honoured his dramatic pieces with her presence. His plays are nine in number. His first publication, however, printed in 1580, was a romance called *Euphues*, which was universally read and admired. This romance, which Blount, the editor of six of his plays, says introduced a new language, especially among the ladies, is, according to Berkenhout, in fact a most contemptible piece of affectation and nonsense: nevertheless it seems very certain, that it was in high estimation by the women of fashion of those times, who, we are told by Whalley, the editor of Ben Johnson's works, had all the phrases by heart:

Lilly. and those who did not speak *Euphuism* were as little regarded at court as if they could not speak French. "He was (says Oldys) a man of great reading, good memory, ready faculty of application, and uncommon eloquence; but he ran into a vast excess of allusion." When or where he died is not known. Anthony Wood says he was living in 1597, when his last comedy was published. After attending the court of Queen Elizabeth 13 years, notwithstanding his reputation as an author, he was under the necessity of petitioning the queen for some small stipend to support him in his old age. His two letters or petitions to her majesty on this subject are preserved in manuscript.

Lilly, *William*, a noted English astrologer, born in Leicestershire in 1602; where his father not being able to give him more learning than common writing and arithmetic, he resolved to seek his fortune in London. He arrived in 1620, and lived four years as a servant to a mantua-maker in the parish of St Clements Danes; but then moved a step higher to the service of Mr Wright, master of the Salters company in the Strand, who not being able to write, Lilly among other offices kept his books. In 1627, when his master died, he paid his addresses to the widow, whom he married with a fortune of 1000l. Being now his own master, he followed the puritanical preachers; and, turning his mind to judicial astrology, became pupil to one Evans, a profligate Welsh parson, in that pretended art. Getting a MS. of the *Ars Notitia* of Corn. Agrippa, with alterations, he drank in the doctrine of the magic circle, and the invocation of spirits, with great eagerness. He was the author of the *Merlinus Anglicus junior;* The Supernatural Sight; and the White King's Prophecy. In him we have an instance of the general superstition and ignorance that prevailed in the time of the civil war between Charles I. and his parliament: for the king consulted this astrologer to know in what quarter he should conceal himself, if he could escape from Hampton court; and General Fairfax, on the other side, sent for him to his army, to ask him if he could tell by his art, whether God was with them and their cause? Lilly, who made his fortune by favourable predictions to both parties, assured the general that God would be with him and his army. In 1648, he published his Treatise of the Three Suns seen the preceding winter; and also an astrological judgment upon a conjunction of Saturn and Mars. This year the council of state gave him in money 50l. and a pension of 100l. per annum, which he received for two years, and then resigned on some disgust. In June 1660, he was taken into custody by order of the parliament, by whom he was examined concerning the person who cut off the head of King Charles I. The same year he sued out his pardon under the great seal of England. The plague raging in London, he removed with his family to his estate at Hersham; and in October 1666 was examined before a committee of the house of commons concerning the fire of London, which happened in September that year. After his retirement to Hersham, he applied himself to the study of physic, and, by means of his friend Mr Ashmole, obtained from Archbishop Sheldon a license for the practice of it. A little before his death he adopted for his son, by the name of *Merlin junior*, one Henry Coley, a taylor by trade; and at the same time gave him the impression of his almanack, after it had been printed for 36 years. He died in 1681 of a dead palsy. Mr Ashmole set a monument over his grave in the church of Walton upon Thames. His "Observations on the Life and Death of Charles, late king of England," if we overlook the astrological nonsense, may be read with as much satisfaction as more celebrated histories; Lilly being not only very well informed, but strictly impartial. This work, with the Lives of Lilly and Ashmole, written by themselves, were published in one vol. 8vo, in 1774, by Mr Burman. Lilly || Lima.

LILY. See Lilium, Botany *Index*.

Lily of the Valley. See Convallaria, Botany *Index*.

LILYBÆUM, in *Ancient Geography*, a city of Sicily, situated on the most westerly promontory of the island of Sicily, and said to have been founded by the Carthaginians on their expulsion from Motya by Dionysius, tyrant of Syracuse. It is remarkable for three sieges it sustained; one against Dionysius the tyrant, another against Pyrrhus, king of Epirus, and the third against the Romans. The two first failed in their attempts, but the Romans with great difficulty made themselves masters of it. No remains of this once stately city are now to be seen, except some aqueducts and temples; though it was standing in Strabo's time.

LILYE, William, the grammarian, was born in the year 1466 at Oldham in Hampshire; and in 1486 was admitted a semi-commoner of Magdalen college in Oxford. Having taken the degree of bachelor of arts, he left the university, and travelled to Jerusalem. Returning from thence, he continued five years in the island of Rhodes, where he studied the Greek language, several learned men having retired thither after the taking of Constantinople. From Rhodes he travelled to Rome; where he improved himself in the Greek and Latin languages, under Sulpitius and P. Sabinus. He then returned to London, where for some time he taught a private grammar-school, being the first person who taught Greek in the metropolis. In 1510, when Dr Colet founded St Paul's school, Lilye was appointed the first master; at which time, it seems, he was married and had many children. In this employment he had laboured 12 years, when, being seized by the plague, which then raged in London, he died in February 1523, and was buried in the north yard of St Paul's. He had the character of an excellent grammarian, and a successful teacher of the learned languages. His principal work is *Brevissima institutio, seu ratio grammatices cognoscendæ;* Lond. 1513. Reprinted times without number, and commonly called *Lilye's grammar*. The English rudiments were written by Dr Colet, dean of St Paul's; and the preface to the first edition, by Cardinal Wolsey. The English syntax was written by Lilye; also the rules for the genders of nouns, beginning with *propria quæ maribus:* and those for the preterperfect tenses and supines, beginning with *As in presenti*. The Latin syntax was chiefly the work of Erasmus. See Ward's preface to his edition of Lilye's grammar, 1732.

LIMA, the metropolis of Peru, contains 209 squares of buildings, which comprise 8222 doors of dwelling houses and shops, and these are branched out into 355 streets. In order to maintain peace and tranquillity among

Lima. among the inhabitants, and for the accommodation of the police, the city is divided into four quarters, containing 35 districts, over each of which there presides an alcaid, who is always elected from among the people of the most distinguished rank. The population, according to estimate made at different periods, is as follows.

In 1600,	-	14,262
1614,	-	25,455
1700,	-	37,259
1746,	-	60,000
1755,	-	54,000
1781,	-	60,000
1790,	-	52,627

By this table it appears, that from 1746 to 1755, the population suffered a diminution of 6000, which was owing to an earthquake that happened at the former period;—a calamity with which that city is often visited. Were it not for this circumstance, Lima would be a perfect paradise, as the adjacent country abounds with corn, wine, oil, sugar, fruits, and flax. Such abundance of wealth do the inhabitants enjoy, that when the duke of Palata was sent from Spain as viceroy to Peru, they paved the streets through which he was to pass with ingots of silver. Libertinism and debauchery are the distinguishing characteristics of the people of Lima, for which even the nuns are as notorious as the rest of the females, seldom being free from venereal complaints.

In the month of March 1543, the emperor Charles V. established an audience at Lima, in consequence of which the inhabitants were freed from the painful necessity of seeking a redress of their grievances at so great a distance as Panama. Among the excellent institutions by which the Peruvian capital is distinguished, we may rank the provincial councils, which shew the constant zeal of the sovereigns of Spain for the defence of religion and preservation of discipline. The prelates, by their pastoral vigilance, spare neither pains nor labour to promote their views, to accomplish their sacred and interesting purposes.

By a decree of the Spanish emperor, which reached Lima in 1553, a university was begun in a central spot of the capital, called the university of St Mark, which is now in a most flourishing condition. Don Francisco Toledo assigned 20,312 piastres as a fund for the maintenance of the professors, arising from the tributes paid by the Indians. Two lectures are given daily on grammar, one on the Indian language, three on philosophy, three on theology, three on law, two on canons, and two on medicine. In the year 1790 an amphitheatre was erected for the use of the anatomical students.

The college for female orphans was founded by Mateo Pastor de Valesco, not at the hour of death, which often gives to charitable endowments an air of suspicion, but when he was in the full possession of perfect health. In 1597 a pious philosopher founded a charitable institution for the support of such helpless children as were laid down in the streets by their unfeeling parents. This building was destroyed by the earthquake of 1687, which laid in ruins the greater part of the city. It was afterwards rebuilt, and is at present in a flourishing condition. In 1559 an hospital was erected for the relief of the unfortunate sick, who might otherwise have perished for want of medical aid, and obtained the name of the *Fellowship of Charity and Compassion*. A general hospital for the poor was begun about 1758, but not completed till 1770, which in 1790 afforded a comfortable asylum to 29 poor people. The asylum for penitent females was founded in 1669. It has been said that there is not a city in the world in which so many alms are distributed as in Lima. Lima, Limassol.

In the centre of the great square there is a fountain of bronze, the ornaments of which are conformable to the rules of the Composite order. It has an elevation of $15\frac{1}{3}$ yards to the helmet of Fame, from which deducting $1\frac{1}{4}$ yards for the height of that figure, the remainder gives the part to which the water rises in order to diffuse itself. This production of art, combining magnificence in every part of it with fine architectural taste, is surrounded by 24 pieces of artillery, and 16 iron chains, a narrow space being left for access to the inhabitants.

Coffee-houses were not known in Lima till the year 1771, when one was opened in the street of Santo Domingo, and another the year following. A third was established in 1775, a fourth in 1782, and a fifth in 1788, in each of which there is a billiard table for the amusement of the inhabitants. We are sorry to say that the barbarous practice of cock-fighting obtains in Lima, for which purpose a building was erected in the year 1762. The tennis court is open to the public, and affords the spectator an agreeable hour of relaxation from more serious pursuits. Lima is situated in W. Long. 76. 44. S. Lat. 12. 1.

LIMASSOL, or Limisso, a town of Cyprus, in the south of the island. Of the ancient city nothing but ruins now remain; though it was a celebrated place, even under the government of the dukes. King Richard, the conqueror of the last of these vassals of the empire, razed it in 1191, and it was never afterwards rebuilt. This city originally was the same as Amathus, or Amathonte; so famous, as Pausanias tells us, for its temple erected in honour of Venus and Adonis. Amathus was the residence of the first nine kings of the island; and, amongst others of Onclistus, who was subjected afterwards by the arms of Artabanes, the Persian general. This city, erected into an archbishopric in the time of the Christians, has produced a number of personages celebrated for their knowledge and the sanctity of their lives. In the neighbourhood there are several copper mines, which the Turks have been forced to abandon. The following lines, in the tenth book of Ovid's Metamorphoses, prove that they were known in the time of that poet: *Maritt's Travels through Cyprus.*

Capta viri forma, non jam Cytherea curat
Littora, non alto repetit Paphon æquore cinctam,
Piscosamque Gnidon, gravidamque Amathunta metallis.

The place where the new Limassol now stands, formerly had the name of *Nemosia*, from the multitude of woods by which it was surrounded. Richard, king of England, having destroyed Amathonte, Guy de Lusignan, in the 12th century, laid the foundation of that new city which the Greeks called *Neopoleos*. The family of Lusignan, who continued to embellish and fortify it, built there palaces, and Greek and Latin churches; and made it the seat of a bishop. When the

Limassol || Limbat.

the island was taken by the Turks in 1570, the Ottoman army entered this city on the 2d of July, and ravaged it without mercy. It was then destroyed by the flames: and at present it is only a wretched place, in which one can scarcely distinguish any remains of its ancient edifices. It is governed by a commissary and a cadi: the latter judges cases only provisionally, before they are carried to the superior tribunal of Nicosia. The harbour is very commodious: and being sheltered from impetuous winds, it affords a safe and calm asylum to vessels when overtaken by a storm. The carob tree is here more abundant than anywhere else; and it is from the port of Limassol that the greatest quantity of its fruit is exported. The inhabitants export also salt, procured from a lake near Salines. Cotton, wheat, barley, and mulberry trees, are both plentiful and well cultivated in this part of the island: the ground also produces all kinds of garden stuffs. The best Cyprus wine is made from the vines that grow on the hills of Limassol. All the wines of the country are collected in this city to be transported to Larnic, where there are the largest cellars, and which on that account becomes the natural centre of commerce.

LIMAX, the SLUG, or *Naked Snail;* a genus of animals belonging to the class vermes. See HELMINTHOLOGY *Index*.

LIMB, in general, denotes the border or edge of a thing; thus we say, the limb of a quadrant, of the sun, of a leaf, &c.

LIMB, in *Anatomy*, an appellation given to the extremities of the body, as to the arms and legs.

LIMB, *Limbus*, in the church of Rome, is used in two different senses. 1. The limb of the patriarchs is said to be the place where the patriarchs waited the redemption of mankind: in this place they suppose our Saviour's soul continued from the time of his death to his resurrection. 2. The limb of infants dying without baptism, is a place supposed to be distiuct both from heaven and hell; since, say they, children dying innocent of any actual sin, do not deserve hell; and, by reason of their original sin, cannot be admitted into heaven.

LIMBAT, the name of a periodical wind common in the island of Cyprus, and of great service in moderating the heats of the climate, which would otherwise be intolerable.

According to the abbé Mariti, it begins to blow at eight in the morning the first day; increases as the sun advances till noon; then gradually weakens, and at three falls entirely. On the second day it arises at the same hour; but it does not attain its greatest strength till about one in the afternoon, and ceases at four precisely. On the third day it begins as before; but it falls an hour later. On the five succeeding days, it follows the same progression as on the third; but it is remarked, that a little before it ceases, it becomes extremely violent. At the expiration of five days it commences a new period like the former. By narrowly observing the sea on that side from which it is about to blow, a little before it arises, one may determine what degree of strength it will have during the day. If the horizon is clear, and entirely free from clouds, the wind will be weak, and even almost insensible; but if it is dark and cloudy, the wind will be strong and violent. This limbat wind, notwithstanding its utility in moderating the excessive heat, often becomes the cause of fevers, especially to Europeans, from their being less habituated to the climate, and more apt than the natives to suffer themselves to be surprised by the cool air when in a state of perspiration. This wind, the falling of which happens an hour sooner or later, is succeeded by a calm, accompanied by a certain moisture that renders the air somewhat heavy. This moisture disappears in the evening, being dissipated by a wind which arises every day at that period. This wind is considered as a land breeze by the inhabitants of the southern and eastern parts of the island; but it is called *a sea breeze* by those in the northern and western, who indeed receive it immediately from the sea. In summer it blows till four o'clock in the morning, and when it ceases, it leaves a profound calm, which continues till the hour when the limbat commences. In autumn and winter it never falls till daybreak, when it is succeeded by other winds, which proceed from the irregularity of the season. In spring it does not continue longer than midnight; and is then succeeded by that happy calm, during which those refreshing dews are formed that moisten the earth at sunrising. The limbat winds, which arise in the beginning of summer, cease about the middle of September; and this is the period when the most insupportable heats commence, because their violence is not moderated by the smallest breeze. They are, however, luckily not of long duration; and about the latter end of October they decrease sensibly, as the atmosphere begins to be loaded with watery clouds.

Limbat || Limburgh.

LIMBORCH, PHILIP, a learned writer among the remonstrants, born at Amsterdam in 1633. After having made great proficiency in his studies, he was, in 1655, admitted to preach in public, which he did first at Haerlem. His sermons had in them no affected eloquence; but were solid, methodical, and edifying. He was chosen minister of Goudja; from whence he was called to Amsterdam, where he had the professorship of divinity, in which he acquitted himself with great reputation till his death, which happened in 1712. He had an admirable genius, and a tenacious memory. He had many friends of distinction in foreign parts as well as in his own country. Some of his letters to Mr Locke are printed with those of that celebrated author. He had all the qualifications suitable to the character of a sincere divine, lived an example of every virtue, and preserved the vigour of his body and mind to a considerable age. He wrote many works, which are esteemed; the principal of which are, 1. *Amica collatio de veritate religionis Christianæ cum erudito Judæo*, in 12mo. 2. A Complete Body of Divinity, according to the opinions and doctrines of the Remonstrants. 3. A History of the Inquisition; which has been translated into English by Dr Samuel Chandler. Limborch also published the works of the famous Episcopius, who was his great-uncle by the mother's side.

LIMBURGH DUCHY, a province of the Austrian Netherlands, bounded by the duchy of Juliers on the north and east, by Luxemburgh on the south, and by the bishopric of Liege on the west. It is about 30 miles in length, and 25 in breadth; and consists of good arable and pasture land, with plenty of wood, and some iron mines.

LIMBURGH, the capital city of the duchy of Limburgh,

Limburgh || Limerick.

burgh, in the Austrian Netherlands, is seated on a steep rock near the river Vesse. This town is small, but pleasantly seated on a hill, with shady woods; and consists chiefly of one broad street, not very well built. It is strong by situation, and almost inaccessible; however, it was taken by the French in 1675, and by the confederates under the duke of Marlborough in 1703, for the house of Austria, to whom it remains by the treaties of Rastadt and Baden, after having been dismantled. It is famous for its cheese, which is exceeding good. E. Long. 6. 8. N. Lat. 50. 40.

LIME, a peculiar earth. See CHEMISTRY *Index*.

Lime-Tree. See CITRUS, BOTANY *Index*.

LIME or *Linden-Tree*. See TILIA, BOTANY *Index*.

Lime-Water. See PHARMACY *Index*.

Lime, or *Lyme*. See LYME.

LIMERICK, a county of Ireland, in the province of Munster, is bounded on the east by Tipperary, on the west by Kerry, on the north by the river Shannon, and on the south by Cork. It is a fruitful and populous tract, the soil requiring little or no manure in most places: besides rich pasture for sheep and cows, it produces rich crops of all kinds of corn and rape, with some hemp. It gave title of earl to the family of Donegal. It contains 375,320 Irish plantation acres, about 56 church livings, though a much greater number of parishes, 10 baronies, three boroughs; and formerly sent eight members to parliament. It now sends two members to the British parliament. It has some clays, furze, fern, and mountain lands, and is famous for good cyder; it has been much benefited by the Palatines, who settled there and increased tillage; they are a laborious independent people, mostly employed in their own farms. This county is well watered by large and small rivers; the Shannon runs at the north side of the county, and fertilizes its banks. The firing of the inhabitants is chiefly turf. At Loghill in the west of the county, there is a mine of coal or culm, but it is more used in kilns than in houses. There are few lakes except Lough Gur; and the principal hills are Knockgreny, Knockany, Knockfiriug, and Toryhill. The mountains lie westward, the highest being Knockpatrick or St Patrick's hill. This county is about 45 miles long and 42 broad.

LIMERICK, or *Lough-Meath*, a market town, a borough, and a bishop's see, now the metropolis of the province of Munster. It is situated on the river Shannon, 94 miles from Dublin; and was the strongest fortress in the kingdom. Its ancient name was Lunneach; and during the first ages it was much frequented by foreign merchants, and after the arrival of the Danes was a place of considerable commerce until the 12th century. It was plundered by Mahon, brother of Brien Boromh, after the battle of Sulchoid, in 970; and Brien, in a future period, exacted from the Danes of this city 365 tons of wine as a tribute, which shows the extensive traffic carried on by those people in that article. About the middle of the 6th century, St Munchin erected a church and founded a bishopric here; which, however, was destroyed by the Danes on their taking possession of this port in 853, and remained in ruins until their conversion to the Christian faith in the 10th century; at which period the church of St Munchin was rebuilt, and the bishopric established. Donald O'Brien, about the time of the arrival of the English, founded and endowed the cathedral; and Donat O'Brien, bishop of Limerick, in the 13th century, contributed much to the opulence of the see. About the close of the 12th century, the bishopric of Innis-Cathay was united to that of Limerick. It was besieged by King William III. in the year 1690, and though there was no army to assist it, the king was obliged to raise the siege. In the year 1691, it was again besieged by the English and Dutch on the 21st of September; and it was obliged to surrender on the 13th of October following, not without the loss of abundance of men; however, the garrison had very honourable and advantageous conditions, and the Roman Catholics by these articles were to be tolerated in the free exercise of their religion. Within a century this place was reckoned the second city in Ireland: at present it has lost its rank; not because it thrives less, but because Cork thrives more. It is composed of the Irish and English town; the latter stands on the King's island, formed by the river Shannon. The town is three miles in circumference, having weekly markets on Wednesday and Saturday, and fairs on Easter Tuesday, 1st July, 4th August, and 12th December. There is a privilege annexed to the fair held on 4th August, that, during 15 days, no person can be arrested in the city or liberties, on any process issuing out of the tholsel court of Limerick. Ardfert and Achadoe, in the county of Kerry, are united to the bishopric of Limerick. This city formerly returned two members to parliament; and now sends one to the British parliament. It gives title of viscount to the family of Hamilton. It is governed by a mayor, sheriffs, recorder, aldermen, and burgesses; there is also a barrack and a military governor and town major: it had some time the privilege of coinage; and different parliaments have been held there. The town was formerly entirely walled in; and in 1760, there were 17 of the city gates standing; but to the great improvement of the place they are now all demolished, except the water-gate of King John's castle. The linen, woollen, and paper manufactures, are carried on here to great extent, and the export of provisions is very considerable. Here are many charitable hospitals, and handsome public buildings, besides the cathedral and other churches. A charter was granted to this city by King John, and confirmed in succeeding reigns. Dr Campbell observes, that as you approach Limerick, the grounds grow rich and exquisitely beautiful; the only disagreeable matter is, that the situation renders the air moist, and consequently rather unwholesome to strangers. About six miles from this is the famous Castleconnel spa. Limerick is 50 miles from Cork, 50 from Galway, and 73 from Waterford. It appears that Limerick obtained the privilege of having mayors 10 years before that right was allowed to the citizens of London. It was before governed by provosts, of which the first was John Spafford in 1195 and 1197; during the provostship of Henry Troy a charter was granted, 9 Richard I. whereby the citizens were allowed to choose mayors and bailiffs, Adam Servant, in 1198, being the first mayor. It continued to be governed by mayors and bailiffs, until the office of bailiff was changed into that of sheriff in 1609.

Limerick.

Limerick || Limning

LIMERICK is also the name of a fair-town in the county of Wexford and province of Leinster; the fairs are four in the year.

LIMINGTON, a town of Hampshire in England. See LYMINGTON.

LIMIT, in a restrained sense, is used by mathematicians for a determined quantity to which a variable one continually approaches; in which sense, the circle may be said to be the limit of its circumscribed and inscribed polygons. In *Algebra*, the term *limit* is applied to two quantities, one of which is greater and the other less than another quantity; and in this sense it is used in speaking of the limits of equations, whereby their solution is much facilitated.

LIMITED PROBLEM, denotes a problem that has but one solution, or some determinate number of solutions; as to describe a circle through three given points that do not lie in a right line, which is limited to one solution only; to divide a parallelogram into two equal parts by a line parallel to one side, which admits of two solutions, according as the line is parallel to the length or breadth of the parallelogram; or to divide a triangle in any ratio by a line parallel to one side, which is limited to three solutions, as the line may be parallel to any of the three sides.

LIMME, a town of Kent, in England, near Hithe, and four miles from Romney, was formerly a port, till choked up by the sands; and though it is thereby become a poor town, yet it has the horn and mace and other tokens left of its ancient grandeur, and used to be the place where the lord warden of the cinque ports was sworn at his entrance upon his office. The Roman road from Canterbury, called *Stane-street*, ended here; and from the brow of its hill may be seen the ruinous Roman walls almost at the bottom of the marshes. Here formerly was a castle, now converted into a farm-house. When or by whom this edifice was erected is not known. It has, however, great marks of antiquity; as has also the adjoining church, on which are several old tombstones with crosses on them.

LIMNING, the art of painting in water colours, in contradistinction to painting which is done in oil-colours.

Limning is much the more ancient kind of painting. Till a Flemish painter, one John van Eyck, better known by the name of *John of Bruges*, found out the art of painting in oil, the painters all painted in water and in fresco, both on their walls, on wooden boards, and elsewhere. When they made use of boards, they usually glued a fine linen cloth over them, to prevent their opening; then laid on a ground of white; lastly, they mixed up their colours with water and size, or with water and yolks of eggs, well beaten with the branches of a fig tree, the juice whereof thus mixed with the eggs; and with this mixture they painted their pieces.

In limning, all colours are proper enough, except the white made of lime, which is only used in fresco. The azure and ultramarine must always be mixed with size or gum; but there are always applied two layers of hot size before the size colours are laid on: the colours are all ground in water, each by itself; and, as they are required in working, are diluted with size water. When the piece is finished, they go over it with the white of an egg well beaten; and then with varnish, if required.

Limning || Linacre.

To limn, or draw a face in colours: Having all the materials in readiness, lay the prepared colour on the card even and thin, free from hairs and spots, over the place where the picture is to be. The ground being laid, and the party placed in a due position, begin the work, which is to be done at three sittings. At the first you are only to dead-colour the face, which will require about two hours. At the second sitting, go over the work more curiously, adding its particular graces or deformities. At the third sitting, finish the whole; carefully remarking whatever may conduce to render the piece perfect, as the cast of the eyes, moles, scars, gestures, and the like.

LIMOGES, an ancient town of France, in the late province of Guienne, and capital of the department of Upper Vienne, with a bishop's see. It is a trading place, and its horses are in great esteem. It is seated on the river Vienne, in E. Long. 1. 20. N. Lat. 45. 50.

LIMOSIN, a late province of France, now the department of Upper Vienne, bounded on the north by La Marche, on the east by Auvergne, on the south by Quercy, and on the west by Perigord and Angoumois. One part is very cold, but the other more temperate. It is covered with forests of chesnut trees; and contains mines of lead, copper, tin, and iron; but the principal trade consists in cattle and horses.

LIMPET, a genus of shell-fish. See PATELLA, CONCHOLOGY *Index*.

LIMPURG, a barony of Germany, in the circle of Franconia, included almost entirely within Suabia, and seated to the south of Hall in Suabia. It is about 15 miles long, and eight broad. Gaildorf and Shonburg, near which is the castle of Limpurg, are the principal places.

LIMPURG, a town of Germany, in the electorate of Triers or Treves, and in Wetteravia, formerly free and imperial, but now subject to the electorate of Treves. It is seated on the river Lhon. E. Long. 8. 13. N. Lat. 50. 18.

LINACRE, THOMAS, physician, was born at Canterbury about the year 1460, and there educated under the learned William Selling: thence he removed to Oxford, and in 1484 was chosen fellow of All-Soul's college. Tilly, *alias* Selling, his former instructor, being at this time appointed ambassador from King Henry VII. to the court of Rome, Mr Linacre accompanied him to Italy, where he attained the highest degree of perfection in the Greek and Latin languages. At Rome, he applied himself particularly to the study of Aristotle and Galen, in the original. On his return to Oxford, he was incorporated doctor of physic, and chosen public professor in that faculty. But he had not been long in England, before he was commanded to court by King Henry VII. to attend the young prince Arthur as his tutor and physician. He was afterwards appointed physician to the king, and after his death, to his successor Henry VIII. Dr Linacre founded two medical lectures at Oxford, and one at Cambridge; but that which most effectually immortalized his name among the faculty, is his being the first founder of the college of physicians in London. He beheld with vexation the wretched state of physic in those times; and,

Linacre || Lincoln.

by an application to Cardinal Wolsey, obtained a patent in 1518, by which the physicians of London were incorporated. The intention of this corporation was to prevent illiterate and ignorant medicasters from practising the art of healing. Dr Linacre was the first president, and held the office as long as he lived. Their meetings were in his own house in Knight-rider street, which house he bequeathed to the college. But our doctor, when he was about the age of 50, took it into his head to study divinity; entered into orders; and was collated, in 1509, to the rectory of Mersham. In the same year he was installed prebendary of Wells, in 1518 prebendary of York, and in the following year was admitted precentor of that cathedral. This, we are told, he resigned for other preferments. He died of the stone in the bladder in October 1524, aged 64; and was buried in St Paul's. Thirty-three years after his death, Doctor John Caius caused a monument to be erected to his memory, with a Latin inscription, which contains the outlines of his life and character. He was a man of great natural sagacity, a skilful physician, a profound grammarian, and one of the best Greek and Latin scholars of his time. Erasmus in his epistles speaks highly of the Doctor's translations from Galen, preferring them even to the original Greek. His works are, 1. *De emendata structura Latini sermonis, libri sex;* London, printed by Pynson, 1524, 8vo, and by Stephens, 1527, 1532. 2. The Rudiments of Grammar, for the use of the princess Mary, printed by Pynson. Buchanan translated it into Latin; Paris, 1536. He likewise translated into very elegant Latin several of Galen's works, which were printed chiefly abroad at different times. Also *Procli Diadachi sphæra*, translated from the Greek; Venet. 1499, 1500.

LINARIA. See FRINGILLA, ORNITHOLOGY *Index.*

LINCOLN, a city of England, and capital of a county of the same name, is distant 132 miles from London. It stands on the side of a hill; at the bottom of which runs the river Witham in three small channels, over which are several bridges. The old *Lindum* of the Britons, which stood on the top of the hill, as appears from the vestiges of a rampart, and deep ditches still remaining, was taken and demolished by the Saxons; who built a town upon the south side of the hill down to the river side, which was several times taken by the Danes, and as often retaken by the Saxons. In Edward the Confessor's time, it appears, from Doomsday book, to have been a very considerable place; and in the time of the Normans, Malmsbury says, it was one of the most populous cities in England. William I. built a castle upon the summit of the hill above the town. The diocese, though the bishopric of Ely was taken out of it by Henry II. and those of Peterborough and Oxford by Henry VIII. is still vastly large, containing the counties of Leicester, Huntingdon, Bedford, and part of Bucks, making 1255 parishes. Though the other churches are mean, the cathedral or minster is a most magnificent piece of Gothic architecture. Here is a prodigious large bell, called *Tom of Lincoln*, which is near five ton in weight, and 23 feet in compass. The hill on which the church stands is so high, and the church itself so lofty, that it may be seen 50 miles to the north and 30 to the south. Besides other tombs, it contains one of brass, in which are the entrails of Queen Eleanor, wife to Edward I. It is said there were anciently 52 churches, which are now reduced to 14. Such is the magnificence and elevation of the cathedral, that the monks thought the sight of it must be very mortifying to the devil; whence it came to be said of one who was displeased, *that he looked like the devil over Lincoln.* The declivity on which the city is built being steep, the communication betwixt the upper and lower town is very troublesome, and coaches and horses are obliged to make a compass. Lincoln.

King Edward III. made this city a staple for wool, leather, lead, &c. It was once burnt; once besieged by King Stephen, who was here defeated and taken prisoner; and once taken by Henry III. from his rebellious barons. It abounded heretofore with monasteries and other religious houses. There is a great pool here, formed by the river on the west side of it, called *Swan Pool*, because of the multitude of swans on it. The Roman north gate still remains entire, by the name of *Newport Gate.* It is one of the noblest of this sort in Britain. It is a vast semicircle of stones of very large dimensions laid without mortar, connected only by their uniform shape. This magnificent arch is 16 feet in diameter, the stones are four feet thick at the bottom. It seems to have a joint in the middle, not a keystone; and on both sides, towards the upper part, are laid horizontal stones of great dimensions, some 10 or 12 feet long. This arch arises from an impost of large mouldings, which are not perceivable now; there are also divers fragments of the old Roman wall. Over against the castle is an intrenchment cast up by King Stephen; and here are carved the arms of John of Gaunt duke of Lancaster, who lived here like a king, and had a mint. The city has a communication with the Trent, by a canal called the Foss-dyke. In the centre of the old ruined castle there is a handsome modern structure for holding the assizes. Its walls are almost entire, and very substantial: the keep or principal tower is situated on a high and very steep mount, which yet continues in its original state, but the remains of the tower on it are only five or six yards high. The outer walls of the castle are of very considerable height, which appear still higher than they really are from their lofty situation and the moat below them. The great gateway is still entire. This city is a county of itself, and has a viscountial jurisdiction, for 20 miles round, which is a privilege that no other city in England can equal. It now consists principally of one street above two miles long, well paved, besides several cross and parallel streets well peopled. Here are some very handsome modern buildings, but more antique ones; upon the whole, it has an air of ancient greatness, arising in a great measure from the number of monastic remains, most of which are now converted into stables, out-houses, &c. Upon the hill, in the castle, are the ruins of the bishop's palace, and other ruins of ancient grandeur and magnificence. The city is supplied with water by several conduits, among which is a modern one, somewhat in the pyramidical style, enriched with sculpture. It is governed by a mayor, twelve aldermen, two sheriffs, a recorder, four chamberlains, a swordbearer, four coroners, and above forty common-council men. Here are four charity schools, where 120 poor children are taught by the

Lincoln || Lindsay.

the widows of clergymen. The neighbouring course is noted for its frequent horse-races. On the down of Lincoln, towards Boston, that rare fowl the bustard is sometimes seen, as well as on Salisbury plain. Lincoln-Heath extends above 50 miles, viz. from Sleaford and Ancaster south to the Humber north, though it is but three or four miles over where broadest. Five miles from Boston, on this extensive heath, Lord le Despenser built a tower for the direction of strangers. It is a lofty square building with a staircase, terminating in a flat roof, and round the base is a square court-yard. Great part of this extensive heath has been enclosed. We read that David king of Scots met King John here, on the 22d of November, in the third year of his reign, and performed homage to him on a hill without the city, for his English territories, in presence of the archbishops of Canterbury, York, and Ragusa, 13 bishops, and a vast number of temporal lords and knights. King Henry VII. kept his court here at Easter in 1486. The population of Lincoln in 1811 was 8861. The Jews were once its chief inhabitants, till they were forced to remove, after having impiously crucified the child of one Grantham, and thrown it into a well, to this day called *Grantham's Well*. Lincoln has given the title of earl to the family of Clinton ever since the reign of Queen Elizabeth. W. Long. 0. 35. N. Lat. 53. 16.

Lincoln-Shire, a maritime county of England, 77 miles in length and 48 in breadth, is bounded on the east by the German ocean, on the west by Nottinghamshire, on the north by Yorkshire, on the south by Rutlandshire, Northamptonshire, and Cambridgeshire. It contains 631 parishes, and 31 market towns, and returns 12 members to parliament. The principal rivers are the Humber, the Trent, the Witham, the Nenn, the Welland, the Ankham, and the Dun. It is divided into three parts, Lindsey, Kestoven, and Holland; the air of which last is unwholesome and foggy, on account of the fens and large marshes. The soil of the north and west parts is very fertile, and abounds in corn and pastures. The east and south parts are not so proper for corn; but then they supply them with fish and fowl, in great plenty, particularly ducks and geese. Lincoln is the principal town. By inland navigation, this county has communication with the rivers Mersey, Dee, Ribble, Ouse, Darwent, Severn, Thames, Avon, &c.; which navigation, including its windings, extends above 500 miles through different counties.

This county, in 1811, contained 46,368 houses; and the total number of inhabitants amounted to 237,891.

LINDESFARN, or Landisfarn. See *Holy-Island*.

LINDSAY, Sir David, a celebrated Scots poet, was descended of an ancient family, and born in the reign of King James IV. at his father's seat, called the *Mount*, near Cupar, in Fifeshire. He was educated at the university of St Andrew's; and, after making the tour of Europe, returned to Scotland in the year 1514. Soon after his arrival, he was appointed gentleman of the bedchamber to the king, and tutor to the young prince, afterwards James V. From the verses prefixed to his dream, we learn that he enjoyed several other honourable employments at court: but, in 1533, he was deprived of all his places, except that of *Lyon king at arms*, which he held to the time of his death. His disgrace was most probably owing to his invectives against the clergy, which are frequent in all his writings. After the decease of King James V. Sir David became a favourite of the earl of Arran, regent of Scotland; but the abbot of Paisley did not suffer him to continue long in favour with the earl. He then retired to his paternal estate, and spent the remainder of his days in rural tranquillity. He died in the year 1553. His poetical talents, considering the age in which he wrote, were not contemptible; but he treats the Romish clergy with great severity, and writes with some humour: but whatever merit might be formerly attributed to him, he takes such licentious liberties with words, stretching or carving them for measure or rhime, that the Scots have a proverb, when they hear an unusual expression, that, *There is nae sic a word in a' Davie Lindsay*. Mackenzie tells us, that his comedies were so facetious, that they afforded abundance of mirth. Some fragments of these comedies are still preserved in manuscript. He is said to have also written several tragedies, and to have first introduced dramatic poetry into Scotland. One of his comedies was played in 1515. Mackenzie says, he understood nothing of the rules of the theatre. He was cotemporary with John Heywood, the first English dramatic poet. His poems are printed in one small volume; and fragments of his plays, in manuscript, are in Mr William Carmichael's collection.

Lindsay || Lindus.

LINDSEY, the third and largest division of the county of Lincolnshire in England. On the east and north it is washed by the sea, into which it runs out with a large front; on the west it has Yorkshire and Nottinghamshire, from which it is parted by the rivers Trent and Dun; on the south it has Kestoven, from which it is separated by the river Witham and the Foss-dyke, which is seven miles long, and was cut by Henry I. between the Witham and the Trent, for the convenience of carriage in those parts. It had its name from Lincoln, the capital of the county, which stands in it, and by the Romans called *Lindum*, by the Britons *Lindcoite*, by the Saxons *Lindo-collyne*, probably from its situation on a hill, and the lakes or woods that were anciently thereabouts; but the Normans called it *Nichol*. It gives title of earl and marquis to the duke of Ancaster.

LINDUS, in *Ancient Geography*, a town of Rhodes, situated on a hill on the west side of the island. It was built by Tlepolemus the son of Hercules, according to Diodorus Siculus; by one of the Heliades, grandsons of the Sun, named *Lindus*, according to Strabo. It was the native place of Cleobulus, one of the wise men. Here we see the famous temple of the Lindian Minerva, which was built by the daughters of Danaus. Cadmus enriched this temple with many splendid offerings. The citizens dedicated and hung up here the seventh of Pindar's Olympic odes, written in letters of gold. The ruins of that superb edifice are still to be seen on the top of a high hill which overlooks the sea. Some remains of the walls, consisting of stones of an enormous size, still show it to have been built in the Egyptian style. The pillars and other ornaments have been carried off. On the most elevated peak of the rock are the ruins of a castle, which may have served as a fortress to the city. Its circumference is very extensive, and is filled with rubbish.

Lindo,

Lindus || Linea.

Lindo, the modern city, stands at the foot of the hill. A bay of considerable wideness and depth serves as a harbour to the city. Ships find good anchorage there in 20 fathoms water. They are safely sheltered from the south-west winds, which constantly prevail through the severest season of the year. In the beginning of winter, they cast anchor off a small village named Massary. Before the building of Rhodes, Lindus was the harbour which received the fleets of Egypt and Tyre. It was enriched by commerce. Mr Savary observes, that a judicious government, by taking advantage of its harbour and happy situation, might yet restore it to a flourishing state.

LINE, in *Geometry*, a quantity extended in length only, without any breadth or thickness. It is formed by the flux or motion of a point. See FLUXIONS, and GEOMETRY.

LINE, in the art of war, is understood of the disposition of an army ranged in order of battle, with the front extended as far as may be, that it may not be flanked.

LINE of Battle, is also understood of the disposition of a fleet in the day of engagement; on which occasion the vessels are usually drawn up as much as possible in a straight line, as well to gain and keep the advantage of the wind as to run the same board. See *Naval TACTICS*.

Horizontal LINE, in *Geography* and *Astronomy*, a line drawn parallel to the horizon of any part of the earth.

Equinoctial LINE, in *Geography*, is a great circle on the earth's surface, exactly at the distance of 90° from each of the poles, and of consequence bisecting the earth in that part. From this imaginary line, the degrees of longitude and latitude are counted.—In astronomy, the equinoctial line is that circle which the sun seems to describe round the earth on the days of the equinox in March and September. See ASTRONOMY and GEOGRAPHY.

Meridian LINE, is an imaginary circle drawn through the two poles of the earth and any part of its surface. See GEOGRAPHY *Index*.

Ship of the LINE, a vessel large enough to be drawn up in the line, and to have a place in a sea-fight.

LINE, in *Genealogy*, a series or succession of relations in various degrees, all descending from the same common father. See DESCENT.

LINE, also denotes a French measure containing the 12th part of an inch, or the 144th part of a foot. Geometricians conceive the line subdivided into six points. The French line answers to the English barley-corn.

Fishing LINE. See *FISHING Line*.

LINES, in *Heraldry*, the figures used in armories to divide the shield into different parts, and to compose different figures. These lines, according to their different forms and names, give denomination to the pieces or figures which they form, except the straight or plain lines. See HERALDRY.

LINEA ALBA, in *Anatomy*, the concourse of the tendons of the oblique and transverse muscles of the abdomen; dividing the abdomen in two, in the middle. It is called *linea*, liné, as being straight; and *alba*, from its colour, which is white.—The *linea alba* receives a twig of a nerve from the intercostals in each of its digitations or indentings, which are visible to the eye, in lean persons especially.

Linea || Linen.

LINEAMENT, among painters, is used for the outlines of a face.

LINEAR NUMBERS, in *Mathematics*, such as have relation to length only; such is a number which represents one side of a plain figure. If the plain figure be a square, the linear figure is called a *root*.

LINEAR Problem; that which may be solved geometrically by the intersection of two right lines. This is called a *simple problem*, and is capable but of one solution.

LINEN, in commerce, a well known kind of cloth, chiefly made of flax.—Linen was not worn by the Jews, Greeks, or Romans, as any part of their ordinary dress. Under-tunics of a finer texture supplied the place of shirts: Hence the occasion for frequent bathing. Alexander Severus was the first emperor who were a shirt: but the use of so necessary a garment did not become common till long after him.

The linen manufacture was probably introduced into Britain with the first settlement of the Romans. The flax was certainly first planted by that nation in the British soil. The plant itself indeed appears to have been originally a native of the east. The woollen-drapery would naturally be prior in its origin to the linen; and the fibrous plants from which the threads of the latter are produced, seem to have been first noticed and worked by the inhabitants of Egypt. In Egypt, indeed, the linen manufacture appears to have been very early: for even in Joseph's time it had risen to a considerable height. From the Egyptians the knowledge of it proceeded probably to the Greeks, and from them to the Romans. Even at this day the flax is imported among us from the eastern nations; the western kind being merely a degenerate species of it.

In order to succeed in the linen manufacture, one set of people should be confined to the ploughing and preparing the soil, sowing and covering the seed, to the weeding, pulling, rippling, and taking care of the new seed, and watering and dressing the flax till it is lodged at home: others should be concerned in the drying, breaking, scutching, and heckling the flax, to fit it for the spinners; and others in spinning and reeling it, to fit it for the weaver: others should be concerned in taking due care of the weaving, bleaching, beetling, and finishing the cloth for the market. It is reasonable to believe, that if these several branches of the manufacture were carried on by distinct dealers in Scotland and Ireland, where our home-made linens are manufactured, the several parts would be better executed, and the whole would be afforded cheaper, and with greater profit.

Staining of LINEN. Linen receives a black colour with much more difficulty than woollen or cotton. The black struck on linen with common vitriol and galls, or logwood, is very perishable, and soon washes out.—Instead of the vitriol, a solution of iron in sour strong beer is to be made use of. This is well known to all the calico-printers; and by the use of this, which they call their *iron-liquor*, and madder root, are the blacks and purples made which we see on the common printed linens.

The

Linen || Linlithgow.

The method of making this iron liquor is as follows: A quantity of iron is put into the sour strong beer; and, to promote the dissolution of the metal, the whole is occasionally well stirred, the liquor occasionally drawn off, and the rust beat from the iron, after which the liquor is poured on again. A length of time is required to make the impregnation perfect; the solution being reckoned unfit for use till it has stood at least a twelvemonth. This solution stains the linen of a yellow, and different shades of buff-colour; and is the only known substance by which these colours can be fixed in linen. The cloth stained deep with the iron-liquor, and afterwards boiled with madder, without any other addition, becomes of the dark colour which we see on printed linens and cottons; which, if not a perfect black, has a very near resemblance to it. Others are stained paler with the same liquor diluted with water, and come out purple.

Linen may also be stained of a durable purple by means of solution of gold in aqua regia. The solution for this purpose should be as fully saturated as possible; it should be diluted with three times its quantity of water; and if the colour is required deep, the piece, when dry, must be repeatedly moistened with it. The colour does not take place till a considerable time, sometimes several days, after the liquor has been applied: to hasten its appearance, the subject should be exposed to the sun and free air, and occasionally removed to a moist place, or moistened with water.—When solution of gold in aqua regia is soaked up in linen cloths, the metal may be recovered by drying and burning them.

Linen flowered with Gold-leaf. Dr Lewis mentions a manufacture established in London for embellishing linen with flowers and ornaments of gold-leaf. The linen, he says, looks whiter than most of the printed linens; the gold is extremely beautiful, and bears washing well. The doctor informs us, that he had seen a piece which he was credibly informed had been washed three or four times, with only the same precautions which are used for the finer printed linens; and on which the gold continued entire, and of great beauty. Concerning the process used in this manufacture, he gives us no particulars.

Fossile Linen, is a kind of amianthus, which consists of flexible, parallel, soft fibres, and which has been celebrated for the use to which it has been applied, of being woven, and forming an *incombustible cloth*. Paper also, and wicks for lamps, have been made of it. See Amianthus, Asbestos, and Mineralogy *Index*.

LING, a species of fish belonging to the genus Cadus, which see in Ichthyology *Index*.

LINGEN, a strong town of Germany, in the circle of Westphalia, and capital of a county of the same name. It belongs to the king of Prussia; and is situated on the river Embs, in E. Long. 7. 30. N. Lat. 52. 32.

LINIMENT, in *Pharmacy*, a composition of a consistence somewhat thinner than an unguent, and thicker than an oil. See Materia Medica *Index*.

LINLITHGOW, the chief town of West Lothian in Scotland. It is supposed to be the *Lindum* of Ptolemy; and to take its name from its situation on a lake, which the word *Lin* or *Lyn* signifies.—It is distant 16 miles from Edinburgh, and is a royal borough and seat of a presbytery. Here is carried on a considerable trade in dressing of white leather, which is sent abroad to be manufactured; and many hands are employed in dressing of flax; also in wool-combing, the wool for which is brought from the borders. Its port, was formerly *Blackness*; but since the decline of that place, *Borrowstounness*, about two miles distant from Linlithgow. The town consists of one open street, from whence lanes are detached on both sides; the houses are built of stone, tolerably neat and commodious; and the place is adorned with some stately public edifices. The palace, built, as Sibbald supposed, on the seat of a Roman station, forms a square with towers at the corners, and stands on a gentle eminence, with the beautiful loch behind it to the west. It was one of the noblest of the royal residences; and was greatly ornamented by James V. and VI. Within the palace is a handsome square; one side of which is more modern than the others, having been built by James VI. and kept in good repair till 1746, when it was accidentally damaged by the king's forces making fires on the hearths, by which means the joists were burnt. A stone ornamented fountain in the middle of the court was destroyed at the same time. The other sides of the square are more ancient. In one is a room ninety-five feet long, thirty feet six inches wide, and thirty-three high. At one end is a gallery with three arches, perhaps for music. Narrow galleries run quite round the old part, to preserve communication with the rooms; in one of which the unfortunate Mary Stuart first saw light. On the north side of the high street, on an eminence east of the palace, stands St Michael's church; a handsome structure, where James V. intended to have erected a throne and twelve stalls for the sovereign and knights of the order of St Andrew. In the market-place is another fountain, and surmounted like the former with an imperial crown. In one of the streets is shown the gallery where the regent Murray was shot. Here was a house of Carmelites, founded by the towns people in 1290, destroyed by the Reformers 1559. The family of Livingston, who took the title of earl from this place, were hereditary keepers of the palace, as also bailiffs of the king's bailifry, and constables of Blackness castle; but by their concern in the rebellion of 1715 all these honours with their estate were forfeited to the crown. Sir James Livingston, son of the first earl by marriage with a daughter of Callendar, was created earl of Callendar by Charles I. 1641, which title sunk into the other. Population, in 1811, 4022.

Linlithgow. Linlithgowshire.

LINLITHGOWSHIRE, or West Lothian, nearly approaches in form to a parallelogram, about 20 miles long from east to west, and from 10 to 13 broad, from north to south. It is bounded by the river Forth on the north; by the river Amond on the south-east; by Lanarkshire on the south-west, and by the river Avon on the west. It is allowed to be one of the richest counties in Scotland, the soil in general being a rich loam, in a high state of cultivation and improvement. Its surface is diversified by gentle swells and fertile plains; and the number of elegant seats almost everywhere to be met with, gives it both a rich and delightful appearance. The whole is a composition of all that is great and beautiful; towns, villages, seats, and ancient towers, decorate each bank of that fine expanse of water, the frith of Forth. The lofty mountains

Linlithgowshire, Linnæus.

tains of the Highlands form a distant, but august boundary towards the north-west; and the eastern view is enlivened with ships perpetually appearing or vanishing, amidst the numerous islands. Hopetoun-house, Barnbougle-castle, Calder-house, Craigie-hall, and the seat of General Dundas, are some of the principal ornaments of this county. It contains two royal boroughs, Linlithgow and Queensferry, besides the towns of Borrowstounness, Bathgate, and Kirklistoun. It is poorly supplied with running water, the Avon and Amond being the only streams which are deserving of notice. There are many valuable minerals found in it in abundance, such as coal, limestone, and some lead ore. In the reign of James VI. a vein of lead was discovered, so rich in silver, that it was thought worthy of being wrought for the sake of that metal alone. Almost every parish abounds with ironstone, which is extensively wrought in the parish of Bathgate. In many places there are appearances of whinstone or basalt, particularly at Dundas-hill, in the parish of Dalmeny, where there is a solid front of basaltic rock, exhibiting in some places regular columns. The population of this county in 1801 amounted to 17,844, and in 1811 19,451. The following is the population of the parishes according to the Statistical History.

	Parishes.	Population in 1755.	Population in 1790—1798.
1	Abercorn	1037	870
	Bathgate	1594	2309
	Borrowstounness	2668	3178
	Carridden	1164	1450
5	Dalmeny	1103	907
	Ecclesmachan	351	215
	Kirklistoun	1461	1504
	Linlithgow	3296	3221
	Livingstone	598	420
10	Queensferry	451	505
	Torphichen	1295	1069
	Uphall	690	600
13	Whitburn	1121	1322
		16,829	17,570
			16,829
		Increase,	741

LINNÆUS, Sir Charles, a celebrated botanist and natural historian, was born on May 24. 1707, in a village called *Roeshult* in Smaland, where his father, Nicholas Linnæus, was then vicar, but afterwards preferred to the curacy of Stenbrohult. We are told, that on the farm where Linnæus was born, there yet stands a large lime tree, from which his ancestors took the surnames of *Tiliander*, *Lindelius*, and *Linnæus;* and that this origin of surnames, taken from natural objects, is not uncommon in Sweden.

This eminent man, whose talents enabled him to reform the whole science of natural history, accumulated, very early in life, some of the highest honours that await the most successful proficients in medical science; since we find that he was made professor of physic and botany, in the university of Upsal, at the age of 34; and six years afterwards, physician to Adolphus king of Sweden; who in the year 1753 honoured him still farther, by creating him knight of the order of the Polar Star. His honours did not terminate here: for in 1757 he was ennobled; and in 1776 the king of Sweden accepted the resignation of his office, and rewarded his declining years by doubling his pension, and by a liberal donation of landed property settled on him and his family.

Linnæus.

From Dr Pultney's General View of the Life and Writings of Linnæus.

It seems probable, that Linnæus's taste for the study of nature was caught from the example of his father; who, as he has himself informed us, cultivated, as his first amusement, a garden plentifully stored with plants. Young Linnæus soon became acquainted with these, as well as with the indigenous ones of his neighbourhood. Yet, from the straitness of his father's income, our young naturalist was on the point of being destined to a mechanical employment; fortunately, however, this design was overruled. In 1717 he was sent to school at Wexsio; where, as his opportunities were enlarged, his progress in all his favourite pursuits was proportionably extended. At this early period he paid attention to other branches of natural history, particularly to the knowledge of insects.

The first part of his academical education Linnæus received under Professor Stobæus, at Lund, in Scania, who favoured his inclinations to the study of natural history. After a residence of about a year, he removed in 1728 to Upsal. Here he soon contracted a close friendship with Artedi, a native of the province of Angermania, who had already been four years a student in that university, and, like himself, had a strong bent to the study of natural history in general, but particularly to ichthyology. Soon after his residence at Upsal, our author was also happy enough to obtain the favour of several gentlemen of established character in literature. He was in a particular manner encouraged in the pursuit of his studies by the patronage of Dr Olaus Celsius, at that time professor of divinity, and the restorer of natural history in Sweden; who, being struck with the diligence of Linnæus in describing the plants of the Upsal garden, and his extensive knowledge of their names, not only patronized him in a general way, but admitted him to his house, his table, and his library. Under such encouragement it is not strange that our author made a rapid progress, both in his studies and the esteem of the professors: in fact, we have a very striking proof of his merit and attainments; since we find, that, after only two years residence, he was thought sufficiently qualified to give lectures occasionally from the botanic chair, in the room of Professor Rudbeck.

In the year 1731, the Royal Academy of Sciences at Upsal having for some time meditated the design of improving the natural history of Sweden, at the instance particularly of Professors Celsius and Rudbeck, deputed Linnæus to make the tour of Lapland, with the sole view of exploring the natural history of that arctic region; to which undertaking, his reputation, already high as a naturalist, and the strength of his constitution, equally recommended him. He left Upsal the 13th of May, and took his route to Gevalia or Gevels, the principal town of Gestricia, 45 miles distant from Upsal. Hence he travelled through Helsingland into Medalpadia, where he made an excursion, and ascended a remarkable mountain before he reached Hudwickswald, the chief town of Helsingland. From hence he went through Angermanland to Hernosand,

Linnæus. nosand, a sea-port on the Bothnic gulf, 70 miles distant from Hudwicksvald. When he had proceeded thus far, he found it proper to retard his journey, as the spring was not sufficiently advanced; and took this opportunity of visiting those remarkable caverns on the summit of Mount Skula, though at the hazard of his life.

When Linnæus arrived at Uma, in West Bothnia, about 96 miles from Hernosand, he quitted the public road, and took his course through the woods westward, in order first to traverse the most southern parts of Lapland. Being now come to the country that was more particularly the object of his inquiries, equally a stranger to the language and to the manners of the people, and without any associate, he committed himself to the hospitality of the inhabitants, and never failed to experience it fully. He speaks in several places, with peculiar satisfaction, of the innocence and simplicity of their lives, and their freedom from diseases. In this excursion he reached the mountains towards Norway; and after encountering great hardships, returned into West Bothnia, quite exhausted with fatigue. Our traveller next visited Pitha and Lula, upon the gulf of Bothnia; from which latter place he took again a western route, by proceeding up the river of that name, and visited the ruins of the temple of Jockmock in Lula Lapland or Lap Mark: thence he traversed what is called the *Lapland Desert*, destitute of all villages, cultivation, roads, or any conveniences; inhabited only by a few straggling people, originally descended from the Finlanders, and who settled in this country in remote ages, being entirely a distinct people from the Laplanders. In this district he ascended a noted mountain called *Wallevari*; in speaking of which he has given us a pleasant relation of his finding a singular and beautiful new plant (*Andromeda tetragona*) when travelling within the arctic circle with the sun in his view at midnight, in search of a Lapland hut. From hence he crossed the Lapland Alps into Finmark, and traversed the shores of the North sea as far as Sallero.

These journeys from Lula and Pitha on the Bothnian gulf, to the north shore, were made on foot; and our traveller was attended by two Laplanders, one his interpreter, and the other his guide. He tells us that the vigour and strength of these two men, both old, and sufficiently loaded with his baggage, excited his admiration: since they appeared quite unhurt by their labour, while he himself, although young and robust, was frequently quite exhausted. In this journey he was wont to sleep under the boat with which they forded the rivers, as a defence against rain, and the gnats, which in the Lapland summer are not less teasing than in the torrid zones. In descending one of these rivers, he narrowly escaped perishing by the oversetting of the boat, and lost many of the natural productions which he had collected.

Linnæus thus spent the greater part of the summer in examining this arctic region, and those mountains on which, four years afterwards, the French philosophers secured immortal fame to Sir Isaac Newton. At length, after having suffered incredible fatigues and hardships, in climbing precipices, passing rivers in miserable boats, suffering repeated vicissitudes of extreme heat and cold, and not unfrequently hunger and thirst, he returned to Tornea in September. He did not take the same route from Tornea as when he came into Lapland, having determined to visit and examine the country on the eastern side of the Bothnian gulf: his first stage, therefore was to Ula in East Bothnia; from thence to Old and New Carlebay, 84 miles south from Ula. He continued his route through Wasa, Christianstadt, and Biorneburgh, to Abo, a small university in Finland. Winter was now setting in apace; he therefore crossed the gulf by the island of Aland, and arrived at Upsal in November, after having performed, and that mostly on foot, a journey of ten degrees of latitude in extent, exclusively of those deviations which such a design rendered necessary. Linnæus

In 1733 he visited and examined the several mines in Sweden; and made himself so well acquainted with mineralogy and the docimastic art, that we find he was sufficiently qualified to give lectures on these subjects upon his return to the university. The outlines of his system on mineralogy appeared in the early editions of the *Systema Naturæ*; but he did not exemplify the whole until the year 1768.

In the year 1734 Linnæus was sent by Baron Reuterholm, governor of Dalecarlia, with several other naturalists in that province, to investigate the natural productions of that part of the Swedish dominions; and it was in this journey that our author first laid the plan of an excellent institution, which was afterwards executed, in a certain degree at least, by himself, with the assistance of many of his pupils, and the result published under the title of *Pan Succicus*, in the second volume of the *Amœnitates Academicæ*.

After the completion of this expedition, it appears that Linnæus resided for a time at Fahlun, the principal town in Dalecarlia; where he tells us that he taught mineralogy and the docimastic art, and practised physic; and where he was very hospitably treated by Dr More, the physician of the place. It also appears, that he contracted at this time an intimacy with one of that gentleman's daughters, whom he married about five years afterwards upon his settling as a physician at Stockholm.—In this journey he extended his travels quite across the Dalecarlian Alps into Norway; but we have no particular account of his discoveries in that kingdom. In 1735 Linnæus travelled over many other parts of Sweden, some parts of Denmark and Germany, and fixed in Holland, where he chiefly resided until his return to Stockholm, about the year 1739. In 1735, the year in which he took the degree of M. D. he published the first sketch of his *Systema Naturæ*, in a very compendious way, and in the form of tables only, in 12 pages in folio. By this it appears that he had at a very early period of his life (certainly before he was 24 years old), laid the basis of that great structure which he afterwards raised, not only to the increase of his own fame, but to that of natural science.

In 1736, Linnæus came into England, and visited Dr Dillenius, the learned professor at Oxford, whom he justly considered as one of the first botanists in Europe. He mentions with particular respect the civilities he received from him, and the privileges he gave him of inspecting his own and the Sherardian collections of plants. It is needless to say, that he visited Dr Martyn, Mr Rand, and Mr Miller, and

Linnæus. that he was in a more singular manner indebted to the friendship of Dr Isaac Lawson. He also contracted an intimate friendship with Mr Peter Collinson, which was reciprocally increased by a multitude of good offices, and continued to the last without any diminution. Dr Boerhaave had furnished him with letters to our great naturalist Sir Hans Sloane; but, it is with regret that we must observe, they did not procure him the reception which the warmth of his recommendation seemed to claim.

One of the most agreeable circumstances that happened to Linnæus during his residence in Holland, arose from the patronage of Mr Clifford, in whose house he lived a considerable part of his time, being now as it were the child of fortune:—*Exivi patriâ triginta sex nummis aureis dives*—are his own words. With Mr Clifford, however, he enjoyed pleasures and privileges scarcely at that time to be met with elsewhere in the world; that of a garden excellently stored with the finest exotics, and a library furnished with almost every botanic author of note. How happy he found himself in this situation, those only who have felt the same kind of ardour can conceive. Whilst in Holland, our author was recommended by Boerhaave to fill the place, then vacant, of physician to the Dutch settlement at Surinam; but he declined it on account of his having been educated in so opposite a climate.

Besides being favoured with the particular patronage and friendship of Boerhaave and Mr Clifford, as is above mentioned, our author had also the pleasure of being contemporary with, and of reckoning among the number of his friends, many other learned persons who have since proved ornaments to their profession, and whose merit has most deservedly raised them to fame and honour. Among these we may properly mention Dr John Burman, professor of botany at Amsterdam, whose name and family are well known in the republic of letters, and to whom our author dedicated his *Bibliotheca Botanica*, having been greatly assisted in compiling that work by the free access he had to that gentleman's excellent library; John Frederick Gronovius of Leyden, editor of Clayton's *Flora Virginica*, and who very early adopted Linnæus's system, Baron Van Swieten, physician to the empress queen; Isaac Lawson, before mentioned, afterwards one of the physicians to the British army, who died much regretted at Oosterhout in the year 1747, and from whom Linnæus received singular and very important civilities; Kramer, since well known for an excellent treatise on the docimastic art; Van Royen, botanic professor at Leyden; Lieberkun of Berlin, famous for his skill in microscopical instruments and experiments. To these may be added also the names of Albinus and Gaubius, and of others, were it requisite to show that our author's talents had very early rendered him conspicuous, and gained him the regard of all those who cultivated and patronized any branch of medical science; and to which, doubtless, the singular notice with which Boerhaave honoured him did not a little contribute.

Early in the year 1738, after Linnæus had left Mr Clifford, and, as it should seem, when he resided with Van Royen, he had a long and dangerous fit of sickness; and upon his recovery went to Paris, where he was properly entertained by the Jussieus, at that time the first botanists in France. The opportunity this gave him of inspecting the Herbaria of Royen and Tournefort, and those of the above-named gentlemen, afforded him great satisfaction. He had intended to have gone from thence into Germany, to visit Ludwig and the celebrated Haller, with whom he was in close correspondence; but he was not able to complete this part of his intended route, and was obliged to return without this gratification. Linnæus.

Our author did not fail to avail himself of every advantage that access to the several museums of this country afforded him, in every branch of natural history; and the number and importance of his publications, during his absence from his native country, sufficiently demonstrate that fund of knowledge which he must have imbibed before, and no less testify his extraordinary application. These were *Systema Naturæ*, *Fundamenta Botanica*, *Bibliotheca Botanica*, and *Genera Plantarum*; the last of which is justly considered as the most valuable of all the works of this celebrated author. What immense application had been bestowed upon it, the reader may easily conceive, on being informed, that before the publication of the first edition the author had examined the characters of 8000 flowers. The last book of Linnæus's composition, published during his stay in Holland, was the *Classes Plantarum*, which is a copious illustration of the second part of the *Fundamenta*.

About the latter end of the year 1738, or the beginning of the next, our author settled as a physician at Stockholm; where he seems to have met with considerable opposition, and was oppressed with many difficulties; but all of these at length he overcame, and got into extensive practice; and soon after his settlement married the lady before spoken of. By the interest of Count Tessin, who was afterwards his great patron, and even procured medals to be struck in honour of him, he obtained the rank of physician to the fleet, and a stipend from the citizens for giving lectures in botany. And what at this time especially was highly favourable to the advancement of his character and fame, by giving him an opportunity of displaying his abilities, was the establishment of the Royal Academy of Sciences at Stockholm; of which Linnæus was constituted the first president, and to which establishment the king granted several privileges, particularly that of free postage to all papers directed to the secretary. By the rules of the academy, the president held his place but three months. At the expiration of that term, Linnæus made his *Oratio de memorabilibus in Insectis*, Oct. 3. 1739; in which he endeavours to excite an attention and inquiry into the knowledge of insects, by displaying the many singular phenomena that occur in contemplating the nature of those animals, and by pointing out, in a variety of instances, their usefulness to mankind in particular, and to the economy of nature in general.

During all this time, however, Linnæus appears to have had his eye upon the botanic and medical chair at Upsal, at this time occupied by Rudbeck, who was far advanced in life. We learn indeed that he was so intent on pursuing and perfecting his great designs in the advancement of his favourite study of nature, that he had determined, if he failed in procuring the

Linnæus. the professorship at Upsal, to accept the offer that had been made to him by Haller of filling the botanic chair at Gottingen. However, in course of time, he obtained his wish. In the year 1741, upon the resignation of Roberg, he was constituted joint professor of physic, and physician to the king, with Rosen, who had been appointed in the preceding year on the death of Rudbeck. These two colleagues agreed to divide the medical departments between them; and their choice was confirmed by the university. Rosen took anatomy, physiology, pathology, and the therapeutic part; Linnæus, natural history, botany, materia medica, the dietetic part, and the diagnosis morborum.

During the interval of his removal from Stockholm to Upsal in consequence of this appointment, our professor was deputed by the states of the kingdom to make a tour to the islands of Oeland and Gothland in the Baltic, attended by six of the pupils, commissioned to make such inquiries as might tend to improve agriculture and arts in the kingdom, to which the Swedish nation had for some time paid a particular attention. The result of this journey was very successful, and proved fully satisfactory to the states, and was afterwards communicated to the public. On his return he entered upon the professorship, and pronounced before the university his oration *de Peregrinationum intra Patriam necessitate*, October 17. 1741; in which he forcibly displays the usefulness of such excursions, by pointing out to the students that vast field of objects which their country held out to their cultivation, whether in geography, physics, mineralogy, botany, zoology, or economics, and by showing the benefit that must accrue to themselves and their country as rewards to their diligence. That animated spirit which runs through the whole of this composition, renders it one of the most pleasing and instructive of all our author's productions.

Linnæus was now fixed in the situation that was the best adapted to his character, his taste, and abilities; and which seems to have been the object of his ambition and centre of his hopes. Soon after his establishment, he laboured to get the academical garden, which had been founded in 1657, put on a better footing, and very soon effected it; procuring also a house to be built for the residence of the professor. The whole had been in ruins ever since the fire in 1702; and at the time Linnæus was appointed professor of botany, the garden did not contain above fifty plants that were exotic. His correspondence with the first botanists in Europe soon supplied him with great variety. He received Indian plants from Jussieu of Paris, and from Van Royen of Leyden; European plants from Haller and Ludwig; American plants from the late Mr Collinson, Mr Catesby, and others; and variety of annuals from Dillenius: in short, how much the garden owed to his diligence and care in a few years, may be seen by the catalogue published under the title of *Hortus Upsaliensis, exhibens Plantas exoticas horto Upsaliensis Academiæ à sese (Linnæo) illatas ab anno* 1742, *in annum* 1748, *additis differentiis synonymis, habitationibus, hospitiis, rariorumque descriptionibus, in gratiam studiosæ juventutis;* Holm. 1748, 8vo. pp. 306. tab. 3. By this catalogue it appears, that the professor had introduced 1100 species, exclusively of all the Swedish plants and of varieties: which latter, in ordinary gardens, amount not unfrequently to one-third of the whole number. The preface contains a curious history of the climate at Upsal, and the progress of the seasons throughout the whole year. Linnæus.

From the time that Linnæus and Rosen were appointed professors at Upsal, it should seem that the credit of that university, as a school of physic, had been increasing: numbers of students resorted thither from Germany, attracted by the character of these two able men; and in Sweden itself many young men were invited to the study of physic by the excellent manner in which it was taught, who otherwise would have engaged in different pursuits.

Whilst Linnæus was meditating one of his capital performances, which had long been expected and greatly wished for, he was interrupted by a tedious and painful fit of the gout, which left him in a very weak and dispirited state; and, according to the intelligence that his friends gave of him, nothing was thought to have contributed more to the restoration of his spirits than the seasonable acquisition, at this juncture, of a collection of rare and undescribed plants.

The fame which our author had now acquired by his *Systema Naturæ*, of which a sixth edition, much enlarged, had been published at Stockholm in 1748 in 8vo. pp. 232, with eight tables explanatory of the classes and orders (and which was also republished by Gronovius at Leyden), had brought, as it were, a conflux of every thing rare and valuable in every branch of nature, from all parts of the globe, into Sweden. The king and queen of Sweden had their separate collections of rarities: the former at Ulricksdahl; the latter, very rich in exotic insects and shells, procured at a great expence, at the palace of Drottninghelm; both of which our author was employed in arranging and describing. Besides these, the museum of the Royal Academy of Upsal had been augmented by a considerable donation from the king, whilst hereditary prince, in 1746; by another from Count Gyllenborg the year before; by a third from M. Grill, an opulent citizen of Stockholm.

From this time we see the professor in a more elevated rank and situation in life. His reputation had already procured him honours from almost all the royal societies in Europe; and his own sovereign, truly sensible of his merit, and greatly esteeming his character and abilities, favoured him with a mark of his distinction and regard, by creating him a knight of the Polar Star. It was no longer *laudatur et alget*. His emoluments kept pace with his fame and honours: his practice in his profession became lucrative; and we find him soon after possessed of his country house and gardens at Hammarby, about five miles from Upsal. He had moreover received one of the most flattering testimonies of the extent and magnitude of his fame that perhaps was ever shown to any literary character, the state of the nation which conferred it, with all its circumstances, duly considered. This was an invitation to Madrid from the king of Spain, there to preside as a naturalist, with the offer of an annual pension for life of 2000 pistoles, letters of nobility, and the perfect free exercise of his own religion: But, after the most perfect acknowledgments of the singular honour done him, he returned for answer,

Linnæus. ‘ that if he had any merits, they were due to his own country.’

In the year 1755, the Royal Academy of Sciences at Stockholm honoured our professor with one of the first premiums, agreeably to the will of Count Sparree, who had decreed two gold medals, of ten ducats value each, to be annually given by the academy to the authors of such papers, in the preceding year's Stockholm Acts, as should be adjudged most useful in promoting agriculture particularly, and all branches of rural economy. This medal bore on one side the arms of the count, with this motto, *Superstes in scientiis amor Frederici Sparree.* Linnæus obtained it in consequence of a paper *De Plantis quæ Alpium Suecicarum indigenæ, magno rei œconomicæ et medicæ emolumento fieri possint:* and the ultimate intention was to recommend these plants as adapted to culture in Lapland. This paper was inserted in the Stockholm Acts for 1754, vol. xv. Linnæus also obtained the *præmium centum aurorum*, proposed by the Imperial Academy of Sciences at Petersburgh, for the best paper written to establish or disprove, by new arguments, the doctrine of the sexes of plants. It was, if possible, an additional glory to Linnæus to have merited this premium from the Petersburgh academy; inasmuch as a professor of that society, a few years before, had with more than common zeal, although with a futility like that of the other antagonists of our author, endeavoured to overturn the whole Linnæan system of botany, by attempting to show that the doctrine of the sexes of plants had no foundation in nature, and was unsupported by facts and experiments.

It appears that Linnæus, upon the whole, enjoyed a good constitution; but that he was sometimes severely afflicted with a *hemicrania*, and was not exempted from the gout. About the close of 1776, he was seized with an apoplexy, which left him paralytic; and at the beginning of the year 1777, he suffered another stroke, which very much impaired his mental powers. But the disease supposed to have been the more immediate cause of his death, was an ulceration of the urinary bladder; of which, after a tedious indisposition, he died, January 11. 1778, in the 71st year of his age. —His principal other works, beside those already mentioned, are, The *Iter Oëlandicum et Gotlandicum*, *Iter Scanicum*, *Flora Suecica*, *Fauna Suecica*, *Materia Medica*, *Philosophia Botanica*, *Genera Morborum*, different papers in the *Acta Upsalicusa*, and the *Amœnitates Academicæ*. The last of this great man's treatises was the *Mantissa Altera*, published in 1771; but before his death he had finished the greatest part of the *Mantissa Tertia*, afterwards completed and published by his son.

To the lovers of science it will not appear strange, nor will it be unpleasant to hear, that uncommon respect was shown to the memory of this great man. We are told, “ that on his death a general mourning took place at Upsal, and that his funeral procession was attended by the whole university, as well professors as students, and the pall supported by sixteen doctors of physic, all of whom had been his pupils.” The king of Sweden, after the death of Linnæus, ordered a medal to be struck, of which one side exhibits Linnæus's bust and name, and the other Cybele, in a dejected attitude, holding in her left hand a key, and surrounded with animals and growing plants; with this legend, *Deam luctus angit amissi;* and beneath, *Post Obitum Upsaliæ, die* x. *Jan.* M.DCC.LXXVIII. *Rege jubente.*— The same generous monarch not only honoured the Royal Academy of Sciences with his presence when Linnæus's commemoration was held at Stockholm, but, as a still higher tribute, in his speech from the throne to the assembly of the states, he lamented Sweden's loss by his death. Nor was Linnæus honoured only in his own country. The late worthy professor of botany at Edinburgh, Dr Hope, not only pronounced an eulogium in honour of him before his students at the opening of his lectures in the spring 1778, but also laid the foundation stone of a monument (which he afterwards erected) to his memory, in the botanic garden there; which, while it perpetuates the name and merits of Linnæus, will do honour to the founder, and, it may be hoped, prove the means of raising an emulation favourable to that science which this illustrious Swede so highly dignified and improved. Linnæus.

As to the private and persoual character of this illustrious philosopher: His stature was diminutive and puny; his head large, and its hinder part very high; his look was ardent, piercing, and apt to daunt the beholder; his ear not sensible to music: his temper quick, but easily appeased.

Nature had, in an eminent manner, been liberal in the endowments of his mind. He seems to have been possessed of a lively imagination, corrected however by a strong judgment, and guided by the laws of system. Add to these, the most retentive memory, an unremitting industry, and the greatest perseverance in all his pursuits; as is evident from that continued vigour with which he prosecuted the design, that he appears to have formed so early in life, of totally reforming and fabricating anew the whole science of natural history; and this fabric he raised, and gave to it a degree of perfection unknown before; and had moreover the uncommon felicity of living to see his own structure rise above all others, notwithstanding every discouragement its author at first laboured under, and the opposition it afterwards met with. Neither has any writer more cautiously avoided that common error of building his own fame on the ruin of another man's. He everywhere acknowledged the several merits of each author's system; and no man appears to have been more sensible of the partial defects of his own. Those anomalies which had principally been the objects of criticism, he well knew every artificial arrangement must abound with; and having laid it down as a firm maxim, that every system must finally rest on its intrinsic merit, he willingly commits his own to the judgment of posterity. Perhaps there is no circumstance of Linnæus's life which shows him in a more dignified light than his conduct towards his opponents. Disavowing controversy, and justly considering it as an unimportant and fruitless sacrifice of time, he never replied to any, numerous as they were at one season.

To all who see the aid this extraordinary man has brought to natural science, his talents must appear in a very illustrious point of view; but more especially to those who, from similarity of tastes, are qualified to see more distinctly the vast extent of his original design, the greatness of his labour, and the elaborate execution he has given to the whole. He had a happy command

Linnæus || Linseed.

mand of the Latin tongue, which is alone the language of science; and no man ever applied it more successfully to his purposes, or gave to description such copiousness, united with that precision and conciseness which so eminently characterize his writings.

The ardour of Linnæus's inclinations to the study of nature, from his earliest years, and that uncommon application which he bestowed upon it, gave him a most comprehensive view both of its pleasures and usefulness, at the same time that it opened to him a wide field, hitherto but little cultivated, especially in his own country. Hence he was early led to regret, that the study of natural history, as a public institution, had not made its way into the universities; in many of which, logical disputations and metaphysical theories had too long prevailed, to the exclusion of more useful science. Availing himself therefore of the advantages which he derived from a large share of eloquence, and an animated style, he never failed to display, in a lively and convincing manner, the relation this study hath to the public good; to incite the great to countenance and protect it; to encourage and allure youth into its pursuits, by opening its manifold sources of pleasure to their view, and showing them how greatly this agreeable employment would add, in a variety of instances, both to their comfort and emolument. His extensive view of natural history, as connected with almost all the arts of life, did not allow him to confine these motives and incitements to those only who were designed for the practice of physic. He also laboured to inspire the great and opulent with a taste for this study; and wished particularly that such as were devoted to an ecclesiastic life should share a portion of natural science; not only as a means of sweetening their rural situation, confined, as many are, perpetually to a country residence, but as what would almost inevitably lead, in a variety of instances, to discoveries which only such situations could give rise to, and which the learned in great cities could have no opportunities to make. Not to add, that the mutual communication and enlargement of this kind of knowledge among people of equal rank in a country situation, must prove one of the strongest bonds of union and friendship, and contribute, in a much higher degree than the usual perishing amusements of the age, to the pleasures and advantage of society.

Linnæus lived to enjoy the fruit of his own labour in an uncommon degree. Natural history raised itself in Sweden, under his culture, to a state of perfection unknown elsewhere; and was from thence disseminated through all Europe. His pupils dispersed themselves all over the globe; and, with their master's fame, extended both science and their own. More than this, he lived to see the sovereigns of Europe establish several public institutions in favour of this study; and even professorships established in divers universities for the same purpose, which do honour to their founders and patrons, and which have excited a curiosity for the science, and a sense of its worth, that cannot fail to further its progress, and in time raise it to that rank which it is entitled to hold among the pursuits of mankind.

LINNET. See Fringilla, Ornithology *Index*.

LINSEED, the seed of the plant linum.—Linseed steeped and bruised in water gives it very soon a thick mucilaginous nature, and communicates much of its emollient virtue to it. See Linum. Linseed || Lintz.

LINT. See Flax; Linen; and Linum, Botany *Index*.

Lint, in *Surgery*, is the scrapings of fine linen, used by surgeons in dressing wounds. It is made into various forms, which acquire different names according to the difference of the figures.—Lint made up in an oval or orbicular form is called a *pledgit*; if in a cylindrical form, or in shape of a date, or olive-stone, it is called a *dossil*.

These different forms of lint are required for many purposes; as, 1. To stop blood in fresh wounds, by filling them up with dry lint before the application of a bandage: though, if scraped lint be not at hand, a piece of fine linen may be torn into small rags, and applied in the same manner. In very large hæmorrhages the lint or rags should be first dipped in some styptic liquor, as alcohol, or oil of turpentine; or sprinkled with some styptic powder. 2. To agglutinate or heal wounds; to which end lint is very serviceable, if spread with some digestive ointment, balsam, or vulnerary liquor. 3. In drying up wounds and ulcers, and forwarding the formation of a cicatrix. 4. In keeping the lips of wounds at a proper distance, that they may not hastily unite before the bottom is well digested and healed. 5. They are highly necessary to preserve wounds from the injuries of the air.—Surgeons of former ages formed compresses of sponge, wool, feathers, or cotton; linen being scarce: but lint is far preferable to all these, and is at present universally used.

LINTERNUM, or Literum, in *Ancient Geography*, a city of Campania, situated at the mouth of the Clanius, which is also called Liturnus, between Cumæ and Vulturnum. It received a Roman colony at the same time with Puteoli and Vulturnum; was improved and enlarged by Augustus; afterwards forfeited its right of colonyship, and became a prefecture. Hither Scipio Africanus the Elder retired from the mean envy of his ungrateful countrymen; and here he died, and was buried: though this last is uncertain, he having a monument both here and at Rome. No vestige of the place now remains.

LINTSTOCK, in military affairs, a wooden staff about three feet long, having a sharp point in one end and a sort of fork or crotch on the other; the latter of which serves to contain a lighted match, and by the former the lintstock is occasionally stuck in the ground, or in the deck of a ship during an engagement. It is very frequently used in small vessels, where there is commonly one fixed between every two guns, by which the match is always kept dry, and ready for firing.

LINTZ, a very handsome town of Germany, and capital of Upper Austria, with two fortified castles; the one upon a hill, the other below it. Here is a hall in which the states assemble, a bridge over the Danube, a manufacture of gunpowder, and several other articles. It was taken by the French in 1741, but the Austrians retook it in the following year. E. Long. 14. 33. N. Lat. 48. 16.

Lintz, a town of Germany, in the circle of the Lower Rhine, and electorate of Cologne, subject to that

Lintz || Liotard.

that elector. It is seated on the river Rhine, in E. Long. 7. 1. N. Lat. 50. 31.

LINUM, FLAX; a genus of plants belonging to the pentandria class; and in the natural method ranking under the 14th order, *Gruinales*. See BOTANY *Index*.

LINUS, in classical history, a native of Colchis, contemporary with Orpheus, and one of the most ancient poets and musicians of Greece. It is impossible, at this distance of time, to discover whether Linus was the disciple of Orpheus, or Orpheus of Linus. The majority, however, seem to decide this question in favour of Linus. According to Archbishop Usher, he flourished about 1280 B. C. and he is mentioned by Eusebius among the poets who wrote before the time of Moses. Diodorus Siculus tells us, from Dionysius of Mitylene the historian, who was contemporary with Cicero, that Linus was the first among the Greeks who invented verses and music, as Cadmus first taught them the use of letters. The same writer likewise attributes to him an account of the exploits of the first Bacchus, and a treatise upon Greek mythology, written in Pelasgian characters, which were also those used by Orpheus, and by Pronapides the preceptor of Homer. Diodorus says that he added the string *lichanos* to the Mercurian lyre; and ascribes to him the invention of rhime and melody; which Suidas, who regards him as the most ancient of lyric poets, confirms. Mr Marpurg tells us, that Linus invented cat-gut strings for the use of the lyre, which, before his time, was only strung with thongs of leather, or with different threads of flax strung together. He is said by many writers to have had several disciples of great renown; among whom were Hercules, Thamyris, and, according to some, Orpheus.—Hercules, says Diodorus, in learning from Linus to play upon the lyre, being extremely dull and obstinate, provoked his master to strike him; which so enraged the young hero, that instantly seizing the lyre of the musician, he beat out his brains with his own instrument.

LION, in *Zoology*. See FELIS, MAMMALIA *Index*.

LIONCELLES, in *Heraldry*, a term used for several lions borne in the same coat of arms.

LIOTARD, called the *Turk*, an eminent painter, was born at Geneva in 1702, and by his father was designed for a merchant; but, by the persuasion of his friends, who observed the genius of the young man, he was permitted to give himself up to the art of painting. He went to Paris in 1725, and in 1738 accompanied the marquis de Puisieux to Rome, who was going ambassador to Naples. At Rome he was taken notice of by the earls of Sandwich and Besborough, then Lord Duncannon, who engaged Liotard to go with them on a voyage to Constantinople. There he became acquainted with the late Lord Edgcumbe, and Sir Everard Fawkener, our ambassador, who persuaded him to come to England, where he staid two years. In his journey to the Levant he had adopted the eastern habit, and wore it here with a very long beard. It contributed much to the portraits of himself, and some thought to draw customers; but he was really a painter of uncommon merit. After his return to the continent, he married a young wife, and sacrificed his beard to Hymen. He came again to England in 1772, and brought a collection of pictures of different masters, which he sold by auction, and some pieces of glass painted by himself, with surprising effect of light and shade, but a mere curiosity, as it was necessary to darken the room before they could be seen to advantage; he affixed, too, as usual, extravagant prices to them. He staid here about two years, as in his former journey. He has engraved some Turkish portraits, one of the empress queen and the eldest archduchess in Turkish habits, and the heads of the emperor and empress. He painted admirably well in miniature; and finally in enamel, though he seldom practised it. But he is best known by his works in crayons. His likenesses were as exact as possible, and too like to please those who sat to him; thus he had great business the first year, and very little the second. Devoid of imagination, and one would think of memory, he could render nothing but what he saw before his eyes. Freckles, marks of the smallpox, every thing found its place; not so much from fidelity, as because he could not conceive the absence of any thing that appeared to him. Truth prevailed in all his works, grace in very few or none. Nor was there any ease in his outline; but the stiffness of a bust in all his portraits. *Walpole*.

Liotard || Lipari.

LIP, in *Anatomy*. See there, N° 102.

Hare-Lip, a disorder in which the upper lip is in a manner slit or divided, so as to resemble the upper lip of a hare, whence the name. See SURGERY.

LIPARA, in *Ancient Geography*, the principal of the islands called *Æolia*, situated between Sicily and Italy, with a cognominal town, so powerful as to have a fleet, and the other islands in subjection to it. According to Diodorus Siculus, it was famous for excellent harbours and medicinal waters. He informs us also, that it suddenly emerged from the sea about the time of Hannibal's death. The name is Punic, according to Bochart: and given it, because, being a volcano, it shone in the night. It is now called *Lipari*, and gives name to nine others in its neighbourhood; viz. Stromboli, Pare, Rotto, Panaria, Saline, Volcano, Fenicusa, Alicor, and Ustica. These are called, in general, the *Lipari Islands*. Some of these are active volcanoes at present, though Lipari is not. It is about 15 miles in circumference; and abounds in corn, figs and grapes, bitumen, sulphur, alum, and mineral waters.

LIPARI, an ancient and very strong town, and capital of an island of the same name in the Mediterranean, with a bishop's see. It was ruined by Barbarossa in 1544, who carried away all the inhabitants into slavery, and demolished the place; but it was rebuilt by Charles V. E. Long. 15. 30. N. Lat. 38. 35.

LIPARI, properly, is the general name of a cluster of islands. These, according to M. Houel, are principally ten in number, the rest being only uninhabitable rocks of narrow extent. The largest and the most populous of them, that above mentioned, communicates its name to the rest. *Volcano* is a desert but habitable island, lying south from the large island of Lipari. *Salines*, which lies west-north-west from the same island; *Felicudi*, nearly in the same direction, but 20 miles farther distant; and *Alicudi*, 10 miles south-west of Felicudi; are inhabited. *Pannari* is east of Lipari, the famous *Stromboli* north-east, and both of them are inhabited.

The

Lipari. The rest are in a desert state; such as *Bazziluzzo*, which was formerly inhabited; *Attalo*, which might be inhabited; and *L'Exambianca*, on which some remains of ancient dwellings are still to be found. *L'Escanera* is nothing but a bare rock.

The *Formicoli*, a word signifying *ants*, are a chain of small black cliffs which run to the north-east of Lipari, till within a little way of Exambianca and Escanera, rising more or less above the water, according as the sea is more or less agitated.

Ancient authors are not agreed with respect to the number of the Lipari islands. Few of those by whom they are mentioned appear to have seen them; and in places such as these, where subterraneous fires burst open the earth, and raise the ocean from its bed, terrible changes must sometimes take place. *Volcanello* and *Volcano* were once separated by a strait, so as to form two islands. The lava and ashes have filled up the intervening strait; and they are now united into one island, and have by this change become much more habitable.

The castle of Lipari stands upon a rock on the east quarter of the island. The way to it from the city leads up a gentle declivity. There are several roads to it. This castle makes a part of the city; and on the summit of the rock is the citadel, in which the governor and the garrison reside. The cathedral stands in the same situation. Here the ancients, in conformity to their usual practice, had built the temple of a tutelary god. This citadel commands the whole city; and it is accessible only at one place. Were an hostile force to make a descent on the island, the inhabitants might retreat hither, and be secure against all but the attacks of famine.

The ancient inhabitants had also fortified this place. Considerable portions of the ancient walls are still standing in different places, particularly towards the south: Their structure is Grecian, and the stones are exceedingly large, and very well cut. The layers are three feet high, which shows them to have been raised in some very remote period. These remains are surrounded with modern buildings. The remains of walls which are still to be seen here, have belonged not only to temples, but to all the different sorts of buildings which the ancients used to erect. The vaults, which are in a better state of preservation than any of the other parts of these monuments, are now converted to the purpose of a prison.

In the city of Lipari there are convents of monks of two different orders; but there are no convents for women, that is to say, no cloisters in which women are confined; those, however, whose heads and hearts move them to embrace a state of pious celibacy, are at liberty to engage in a monastic life, with the concurrence of their confessors. They put on the sacred habit, and vow perpetual virginity, but continue to live with their father and mother, and mix in society like other women. The vow and the habit even enlarge their liberty. This custom will, no doubt, M. Houel observes, appear very strange to a French woman; but this was the way in which the virgins of the primitive church lived. The idea of shutting them up together did not occur till the fifth century. The life of these religious ladies is less gloomy than that which those under the same vows lead in other countries. They wear clothes of particular colours, according as they belong to this or that order. Their dress gives them a right to frequent the churches at any hours; and the voice of censure, which takes particular pleasure in directing her attacks against pious ladies, goes so far as to assert that some young women assume the habit with no other views but that they may enjoy greater freedom. Lipari.

In this island oxen of a remarkably beautiful species are employed in ploughing the ground. The ancient plough is still in use here. The mode of agriculture practised here is very expeditious. One man traces a furrow, and another follows to sow in it grain and pulse. The ploughman, in cutting the next furrow, covers up that in which the seed has been sown: and thus the field is both ploughed and sown at once. Nature seems to be here uncommonly vigorous and fertile. Vegetation is here more luxuriant, and animals gayer and more healthful, than almost anywhere else.

Near the city of Lipari, the traveller enters deep narrow roads, of a very singular appearance. The whole island is nothing but an assemblage of mountains, all of them consisting of ashes or lava discharged from the depths of the volcano by which it was at first produced. The particles of this puzzolana, or ashes, are not very hard; the action of the rain water has accordingly cut out trenches among the mountains; and these trenches being perhaps less uneven than the rest of the surface, have of consequence been used as roads by the inhabitants, and have been rendered much deeper by being worn for so many ages by the feet of men and other animals. These roads are more than five or six fathoms deep, and not more than seven or eight feet wide. They are very crooked, and have echoes in several places. You would think that you were walking through narrow streets without doors or windows. Their depth and windings shelter the traveller from the sun while he is passing through them; and he finds them deliciously cool.

The first volcanic eruption in the Lipari islands mentioned in history, is that of which Callias takes notice in his history of the wars in Sicily. Callias was contemporary with Agathocles. That eruption continued without interval for several days and nights; and threw out great stones, which fell at more than a mile's distance. The sea boiled all around the island. The works of Callias are lost, and we know not whether he descended to a detail of particulars concerning the ravages produced by this eruption. Under the consulship of Æmilius Lepidus and L. Aurelius Orestes, 126 years before the Christian era, these islands were affected with a dreadful earthquake. The burning of Ætna was the first cause of that. Around Lipari and the adjacent islands, the air was all on fire. Vegetation was withered; animals died; and fusible bodies, such as wax and resin, became liquid. If the inhabitants of Lipari, from whom our author received these facts, and the writers who have handed down an account of them, have not exaggerated the truth, we must believe that the sea then boiled around the island; the earth became so hot as to burn the cables by which vessels were fixed to the shore, and consumed the planks, the oars, and even the small boats.

Pliny, the naturalist *, speaks of another similar event which happened 30 or 40 years afterwards, in the

* Lib. ii. cap. 100.

Lipari. the time of the war of the allied states of Italy against Rome. One of the Æolian islands, says he, was all on fire as well as the sea; and that prodigy continued to appear, till the senate appeased, by a deputation, the wrath of the gods. From the time of that war, which happened 86 years before the birth of our Saviour, till the year 144 of our era, we have no account of any eruption of these volcanoes: and from that period again, till the year 1444, we hear of no explosion from them, that is, for the space of 1300 years. But at that time both Sicily and the Æolian isles were agitated by dreadful shocks of earthquakes: the volcano of these isles poured forth streams of lava with an awful violence, and emitted a volume of flame and smoke which rose to an amazing height. After that it discharged enormous stones which fell at the distance of more than six miles.

A century later, in the year 1550, the fury of this volcano was again renewed. The ashes and stones discharged from the crater filled up the strait between Volcano and Volcanello.

About two centuries after that, in the year 1739, there was a sixth eruption. The burstings of the volcanic fire were attended with a noise so dreadful, that it was heard as far as Melazzo in Sicily.

Father Leandro Alberti says, that on one of those dreadful occasions, the women of Lipari, after imploring in vain all the saints, vowed to drink no more wine if the volcano should spare them. Their giving up this small gratification was doubtless of great service; yet the eruptions still continue, and have even become more frequent since that time. Only 36 years intervened between this eruption and that which happened in the year 1775. The whole island was then shaken; subterraneous thunder was heard; and considerable streams of flame, with smoke, stones, and vitreous lava, issued from the crater. Lipari was covered over with ashes; and part of these was conveyed by the winds all the way into Sicily. Five years after, however, in the month of April 1780, there issued a new explosion from Volcano; the smoke was thick, the shocks constant, and the subterraneous noise very frequent. So great was the consternation among the inhabitants of Lipari on this occasion, that the commander Deodati Dolomieu, who visited these islands not long after that event, informs us, that the inhabitants in general, but especially the women, devoted themselves as slaves to the service of the blessed virgin; and wore on their arms, as tokens of their servitude, small iron chains, which they still continue to wear.

This act of piety, however, was not so efficacious as the deputation of the senate had been. For after that deputation, more than 200 years passed before the Æolian isles were afflicted by any other eruption, at least by any considerable one: Whereas, in three years after the ladies devoted themselves in so submissive a manner to the service of the virgin, the isles of Lipari were agitated anew by that fatal earthquake which ravaged Calabria and part of Sicily, on the 5th of February 1783.

The dry baths of St Calogero, in the island of Lipari, are stoves, where sulphureous exhalations, known to be of a salutary nature, ascend out of the earth by holes or spiracles. A range of apartments are built around the place where the exhalations arise. Lipari. The heat is communicated through those apartments, in such a way, that when entering at one end, you advance towards the other, the heat still increases upon you till you gain the middle apartment, and again diminishes in the same manner as you proceed from the middle to the other end of the range of chambers. In consequence of this disposition of these apartments, the sick person can make choice of that temperature which best suits the nature of his disease. There are a few miserable huts and a small chapel for the accommodation of the people who repair to these baths. The people of the place are ready to attend them. Physicians likewise follow their patients thither, when the disease is of such a nature as to render their attendance requisite, and the patient rich enough to afford them handsome fees: but there is no physician settled in the place. Besides these dry baths, there are baths of hot water, distinguished by the name of *St Calogero's Baths*. There are around them buildings sufficient to lodge a considerable number of sick people with their necessary attendants. At present, however, these buildings are but in a bad condition.

The baths consist of two halls; one square, the other round. The former is antique; it has been built by the Romans; it is arched with a cupola, and 12 feet in diameter; it has been repaired: The other is likewise arched with a cupola both within and without. The water comes very hot into the first. It gushes up from among pieces of lava, which compose a part of the mountain at the foot of which these baths are built. Those stones remain in their natural state. All that has been done is the raising of a square building enclosing them. Within that building the sick persons either sit down on the stones, or immerse themselves in the intervening cavities which are filled with water. They continue there for a certain time, and approach nearer to, or remain at a farther distance from the spring, according as their physician directs. The place serves also as a stove. The hot vapours arising from the water communicate to the surrounding atmosphere a considerable degree of heat. It is indeed not inferior to that of the hot baths of Termini, which owe their heat to a similar cause. In these baths, therefore, a person can have the benefit either of bathing in the hot water, or of exposing himself to the vapour, the heat of which is more moderate. The bath before mentioned, under the appellation of *dry bath*, is also a stove; but the hot vapour with which it is filled issues directly from the volcano. The place of the bath is, however, at such a distance from the volcanic focus, that the heat is not at all intolerable.

The mountain at the foot of which these baths are situated is round, and terminates at the summit in a rock of petrified ashes, which are very hard and of a very fine grain. This petrifaction consists of pretty regular strata, and appears to have been greatly prior in its origin to the adjacent rocks; which consist likewise of ashes, but ashes that have been deposited at a much later period. From this rock there proceeds likewise a stream of hot water, by which some mills in the neighbourhood are moved.

It cannot but appear surprising that nature has placed nearly on the summit of a volcanic mountain springs

Lipari. springs which supply so considerable a quantity of water. To account for such a phenomenon would be well worthy of some ingenious naturalist. Nor are these hot springs all; proceeding around the same hill, at about a mile's distance, we find a spring of cold water rising from the summit of the same rock, which on the north-west produces three hot springs. The cold water is very pleasant to drink, and much used both by men and cattle.

Among these mountains there are many enormous loose masses of lava, the appearance of which, M. Houel informs us, naturally leads the observer to take notice, that the lava of the volcano of Lipari is of a much greater diversity of colours, and those richer and more lively, than the lava of Vesuvius and Ætna. The lava of Lipari is in some places, for several miles, of a beautiful red colour. It contains likewise in great abundance small black crystallized scoriæ, as well as the small white grains which are commonly found in lava.

Among the eminences which overlook the city of Lipari, there are some rocks of a species which is very rare in Europe. These are large masses of vitrified matter, which rise six or eight feet above the surface of the ground, and appear to extend to a great depth under it. They exist, through that range of mountains, in enormous masses, mixed with lavas of every different colour, and always standing detached and insulated. Were they cut and followed under ground, they would probably be found to exist in immense quarries in the bowels of the earth. The glass of which they consist might be employed with great advantage in manufactures. It is ready made, and might be easily purified. It is green, compact, and transparent.

The cultivation of the ground is the chief employment of the inhabitants of Lipari. The possession of a few acres of land here gives a man great importance. Parents, when they settle their children, rather give them money than any part of their lands.

More than two-thirds of the island are planted with vines: three-fourths of the grapes which these produce are dried, and sent mostly to London under the name of *passola*. There are different sorts of passola: one of these, called the *black passolina*, is prepared from a particular kind of grape, of which the berries are uncommonly small; and sold to Marseilles, Holland, and Trieste. The vines are in small arbours, which rise only to the height of two feet and a half above the ground. Under these arbours there grow beans, gourds, and other leguminous vegetables. In so hot a climate, the shade of the vines does not injure but protect the vegetables growing under it: they would otherwise be withered by the heat of the sun.

The method of preparing passola and passolina is curious enough: They first make a lixivium of common ashes; after boiling this, they pass it through a cloth or a sieve; they then put it again on the fire; and when it is observed to boil hard, suddenly immerse the grapes, but instantly bring them out again, and expose them to the sun to dry on broad frames of cane. When sufficiently dry, the raisins are put into casks and barrels to be sold and exported. The number of casks of different sorts of raisins annually exported from Lipari is estimated at 10,000.

This island likewise produces figs. There is some white malmsey and a little red wine exported from it. Lipari || Lippi

About 60 or 80 years since, sulphur was one of the articles with which the inhabitants of this island supplied foreign merchants. But that trade has been given up, from an idea which the Liparese entertain, that sulphur infects the air so as to injure the fertility of the vines. The same prejudice prevails in Sicily, but it seems to be ill founded.

There are courts of justice in Lipari of the same powers and characters with those in the cities of Sicily. Causes of more than ordinary importance are carried to Palermo.

The island is entirely free from every kind of imposition. The king receives nothing from it; because Count Roger anciently bestowed on its bishop all his rights of royalty over Lipari. The bishop there received annually from the inhabitants a tenth part of the products of their lands. They afterwards, to prevent fraud, estimated the value of that tithe for one year; and on the condition of their paying in future a sum of money equal to what that year's tithe was valued at, he not only gave up his right to the tithe, but also ceded to them a considerable extent of land which belonged to him.

In the archiepiscopal palace, and in the palace of the Baron de Monizzio, there are some noble pieces of painting by Sicilian painters:—A St Peter, a St Rosalia, Jesus disputing with the Jewish doctors, the adulterous woman, the incredulity of St Thomas.

LIPOTHYMIA, Fainting, may arise from several causes; as too violent exercise, suppression of the menses or other accustomed evacuations, &c. See Medicine *Index*.

LIPPA, a town of Hungary, with a castle. It was taken by the Turks in 1552; by the Imperialists in 1688; and by the Turks again in 1691; who abandoned it in 1695, after having demolished the fortifications. It is seated on a mountain, in E. Long. 21. 55. N. Lat. 36. 5.

LIPPE, the capital of a county of the same name in Germany, and the circle of Westphalia. It is seated on a river of the same name, and was formerly the residence of the principal branch of the house of Lippe. It is now in the possession of the king of Prussia, and carries on a good trade in preparing timber for building vessels on the Rhine, with which it has a communication by the river Lippe. The country round it is unwholesome and marshy. E. Long. 8. 12. N. Lat. 51. 43.

LIPPI, Lorenzo, a painter of history and portraits, was born in 1606, and learned the principles of painting from Matteo Roselli. He had an exquisite genius for music and poetry, as well as for painting, and in the latter his proficiency was so great, that some of his compositions in the historical style were taken for those of Roselli. However, growing at last dissatisfied with the manner of that master, he chose the manner of Santi di Titi, who was excellent both in design and invention, and appeared to have more of simple nature and truth in his compositions than any other artist of that time. At Florence Lippi painted many grand designs for the chapels and convents, by which he enlarged his reputation; and at the court of Inspruck, he painted a great number of portraits of the first no-

Lippi || Lis.

bility, which were deservedly admired. Yet, although he was fond of imitating simple nature without any embellishments from invention, his works are held in the highest esteem for the graceful airs of the heads, for the correctness of his outline, and for the elegant disposition of the figures. He died in 1664.

LIPSIUS, Justus, a learned critic, was born at Isch, a small village near Brussels, in 1547. After having distinguished himself in polite literature, he became secretary to Cardinal de Granvellan at Rome, where the best libraries were open to him; and he spent much labour in collating the MSS. of ancient authors. He lived 13 years at Leyden; during which he composed and published what he esteems his best works; but settled at Louvain, where he taught polite literature with great reputation. He was remarkable for unsteadiness in religion, fluctuating often between the Protestants and Papists; but he became finally a bigotted catholic. He died at Louvain in 1606; and his works are collected in six volumes folio.

LIQUEFACTION, an operation by which a solid body is reduced into a liquid by the action of heat. See Fluidity, Chemistry *Index*.

LIQUID, a body which has the property of fluidity, as water, mercury, &c. See Fluid.

Liquid, among grammarians, is a name applied to certain consonants opposed to mutes. Thus l, m, n, and r, are liquids.

LIQUIDAMBAR, Sweet-gum-tree, a genus of plants, belonging to the monœcia class; and in the natural method ranking with those of which the order is doubtful. See Botany *Index*.

LIQUOR, a name for any fluid substance of the aqueous or spirituous kind.

The principal beverage amongst the Jews, as well as the Greeks and Romans, in their early state, was water, milk, and the juices of various plants infused therein. For a long time, under the commonwealth of Rome, wine was so scarce, that in their sacrifices to the gods the libations were made with milk only. Wine did not become common there till A. U. C. 600, when vines began to be planted.

Liquor of Flints. See Chemistry, N° 1450.

Smoking Liquor of Libavius. See Chemistry, N° 1809.

Mineral Anodyne Liquor of Hoffman. This is a composition of highly rectified spirit of wine, vitriolic ether, and a little of the dulcified oil of vitriol. See Chemistry, N° 849.

LIQUORICE. See Glycyrrhiza, Botany and Materia Medica *Index*.

LIRIODENDRON, the Tulip tree, a genus of plants belonging to the polyandria class, and in the natural method ranking under the 52d order, *Coadunatæ*. See Botany *Index*.

LIS, or Lys, *John Vander*, painter of history, landscapes, and conversations, was born at Oldenburgh in 1570, but went to Haerlem to place himself as a disciple under Henry Goltzius; and as he was endowed with great natural talents, he soon distinguished himself in that school, and imitated the manner of his master with great success. He adhered to the same style till he went to Italy; where, having visited Venice and Rome, he studied the works of Titian, Tintoretto, Paolo Veronese, and Domenico Fetti, so effectually, that he improved his taste and judgment, and altered his manner entirely. He soon received marks of public approbation; and his compositions became universally admired for their good expression, for their lively and natural colouring, and the sweetness and delicacy of his pencil: although it must be acknowledged, that he could never totally divest himself of the ideas and taste peculiar to the Flemings. His subjects usually were histories taken from the sacred writings, or the representations of rural sports, marriages, balls, and villagers dancing, dressed in Venetian habits; all which subjects he painted in a small as well as a large size, with a number of figures, well designed, and touched with a great deal of delicacy. He was likewise accounted to paint naked figures admirably, with natural and elegant attitudes, and a very agreeable turn of the limbs. A capital picture of this master is, Adam and Eve lamenting the death of Abel; which is extremely admired, not only for the expression, but also for the beauty of the landscape; and in the church of St Nicholas at Venice is another of his paintings, representing St Jerome in the desert, with a pen in his hand, and his head turned to look at an angel, who is supposed to be sounding the last trumpet. The colouring of this picture is rather too red; but it is designed in a fine style, and charmingly penciled. The paintings of this master are very rarely to be purchased. He died in 1629.

Lis, Lisbon.

Lis, *John Vander*, of Breda, historical painter, was born at Breda about the year 1601, and became a disciple of Cornelius Polemburg, whose manner he imitated with extraordinary exactness, in the tint of his colouring, his neatness of penciling, and the choice of his subjects. There are some paintings of this master's hand, which, though they appear to have somewhat less freedom and lightness of touch, are nearly equal to those of Polemburg, and are frequently taken to be his. At Rotterdam, in the possession of Mr Bisschop, there is a delicate painting representing Diana in the bath, attended by her nymphs; and his most capital performance, in England, is said to be in the possession of the viscount Middleton. The portrait of Vander Lis, painted by himself, is in the possession of Horace Walpole, Esq. which is described by that ingenious gentleman as being worked up equal to the smoothness of enamel.

LISBON, the capital of the kingdom of Portugal, situated in the province of Estremadura, on the banks of the river Tagus, in W. Long. 9. 25. N. Lat. 38. 42. It was anciently called *Olisipo*, *Olisippo*, and *Ulyssipo*. It first became considerable in the reign of King Emanuel; from that time it has been the capital of the kingdom, the residence of its monarchs, the seat of the chief tribunals and offices of the metropolitans, a noble university, and the receptacle of the richest merchandise of the East and West Indies. Its air is excellent; being refreshed by the delightful sea breezes, and those of the Tagus. The city extends for about two miles along the Tagus; but its breadth is inconsiderable. Like old Rome, it stands on seven hills: but the streets in general are narrow and dirty, and some of them are very steep; neither are they lighted at night. The churches, in general, are very fine; but the magnificence of the chapel royal is amazing. Here is one of the finest harbours in the world; and there were a great number

not

Lisbon || Lisle.

not only of fine churches and convents here, but also of other public buildings, and particularly of royal palaces, and others belonging to the grandees; but the greatest part of them, and of the city, were destroyed by a most dreadful earthquake, on Nov. 1. 1755, from which it will require a long time to recover. The inhabitants, before the earthquake, did not at most exceed 150,000. The government of it is lodged in a council, consisting of a president, six counsellors, and other inferior officers. The harbour has water enough for the largest ships, and room enough for 10,000 sail without being crowded. For its security, there is a fort at the mouth of the river, on each side, and a bar that runs across it, and is very dangerous to pass without pilots. Higher up, at a place where the river is considerably contracted, there is a fort called *Torre de Belem*, or the *Tower of Belem*, under whose guns all ships must pass in their way to the city; and on the other side are several more forts. Before the earthquake, most of the private houses were old and unsightly, with lattice windows; and the number of convents and colleges amounted to 50, namely, 32 for monks, and 18 for nuns. The king's principal palace stands on the river, and is large and commodious. Of the hospitals, that called the *Great* is obliged to receive all persons, of what degree, nation, or religion soever, without exception. At the village of Belem, near Lisbon, is a noble hospital for decayed gentlemen who have served the king, and have not wherewithal to maintain themselves. That called the *House of Mercy* is also a noble charity. In the centre of the city, upon one of the highest hills, is the castle, which commands the whole, being large and ancient, and having always a garrison of four regiments of foot. The cathedral is a vast edifice of the Gothic kind, but heavy and clumsy: it contains, however, great riches. The whole city is under the ecclesiastical jurisdiction of the patriarch, who was appointed in the year 1717. Here is also an archbishop, who has, or at least had, before the erection of the patriarchate, a revenue of 40,000 crusadoes, or 6000l. The university, which was removed for some time to Coimbra, but afterwards restored to its ancient seat, makes a considerable figure, though much inferior to that of Coimbra. In December 1807 the Portuguese court retired from Lisbon to Brazil, and the city was occupied by the French, who retained possession of it till August 1808, when it was given up under the convention of Cintra.

LISBURN, a town of Ireland, in the the county of Antrim and province of Ulster, 73 miles from Dublin. It was burnt down about 50 years ago; but is now rebuilt in a neat and handsome manner, and has a large linen manufactory. It is seated on the river Laggan, in W. Long. 6. 20. N. Lat. 54. 31. It gives title of earl to the family of Vaughan, and formerly returned two members to parliament.

LISIEUX, a considerable town of France, in Upper Normandy, with a bishop's see. The churches and religious houses, and the bishop's palace, are all very handsome structures. It is a trading place; and is seated at the confluence of the rivers Arbeck and Gassi, in E. Long. 0. 20. N. Lat. 49. 11.

LISLE, a large, rich, handsome, and strong town of French Flanders, of which it is the capital, with a strong castle, and a citadel built by Vauban, and said to be the finest in Europe, as well as the best fortified. The largest square, and the public buildings, are very handsome; and they have manufactures of silks, cambrics, and camblets, as well as other stuffs, which have been brought to great perfection. It was taken by the duke of Marlborough, after three months siege and the loss of many thousands of men, in 1708, but restored to the French by the treaty of Utrecht, in consideration of their demolishing the fortifications of Dunkirk. It was besieged by the Austrians in 1792, who on the 29th of September began a heavy cannonading against it, which continued incessant till the 6th of October, when they were obliged to raise the siege, after having thrown into the city about 30,000 red-hot balls, besides 6000 bombs. It is seated on the river Duele, 14 miles west of Tournay, 32 south-west of Ghent, 37 north-west of Mons, and 130 north of Paris. E. Long. 3. 9. N. Lat. 50. 33. Lisle.

LISLE, *Joseph Nicholas de*, an eminent astronomer and geographer, was born at Paris in the year 1688. His father having taught him the principles of grammar, he afterwards attended lectures in the Mazarine college, where he delivered his rhetorical exercises in 1706. A total eclipse of the sun having taken place on the 12th of March that year, his taste for mathematics was thus discovered, and he was accordingly placed under a proper tutor, who taught him the elements of geometry, fortification and mechanics; but his favourite study was the science of astronomy.

In 1707 he was offered the place of an engineer at Martinico, which made him acquainted with the art of drawing, an acquisition which proved highly useful to him in his geographical labours, and also in the study of astronomy. His father having got a copy of An Account of a Voyage to the South sea from his son's master, young de Lisle was excited by the perusal of it to the study of natural history, and he began to make collections of insects, and sketch their varieties; but being afterwards persuaded that so extensive a study, requiring such immense collections to be made as he found in Aldrovandus, was wholly incompatible with that unremitting attention which his favourite science required, he relinquished it accordingly. The attention he paid to astronomical researches was so great, that he was considered as meriting the correspondence of some of the ablest astronomers of Europe at the early age of 21. In 1709 he made a wooden quadrant, which he divided with the utmost accuracy, and which answered the intended purpose in his early observations. He likewise constructed a table for M. Cassini, of the right ascensions and declinations, adapted to all the degrees of latitude and longitude of the planets, and the obliquity of the ecliptic; this table was made use of by M. Cassini in foretelling the occultations of the stars by the moon.

De Lisle being informed by Cassini in 1710 of his method of representing an eclipse of the sun, by the projection of a terrestrial parallel on a plane; he instantly conceived the idea of applying it to every part of the earth, by means of a globe mounted and prepared for that purpose. Such astronomers as he made acquainted with his project, conceived it to be impracticable; but when the machine was completed, they bestowed the highest encomiums on the noble invention. The first memorable observation made by de Lisle was

Lisle. that of the moon, on the 23d of January 1712, after which his labours experienced some interruption from bodily indisposition. About this time the situation of his father's numerous family rendered it necessary that he should provide for himself, so that he was obliged to make his astronomical knowledge subservient to the absurdities of astrology, receiving pecuniary presents from the regent for his services. He received also in 1715 the grant of a pension of 600 livres, on which occasion he calculated tables of the moon according to the Newtonian theory, prior to Halley's communications to him, which were printed in 1719. De Lisle was chosen a member of the Academy of Sciences in 1714, on which account his exertions were redoubled.

In 1720 he delivered a proposal to the academy for ascertaining in France the figure of the earth, a design which was carried into execution some years afterwards. In 1723 he delivered to the same academy a memoir on the transits of Mercury, wherein a method of calculating them was proposed by him, the way in which they were to be observed, and the inferences to be deduced from these observations. He proposed the use of the quadrant in observing the transits of Venus and Mercury, which has been found superior to any other instrument for that important purpose, and is sanctioned since his day by the practice of the ablest astronomers.

Our distinguished philosopher came over to England in the year 1724, where he became acquainted with Newton and Halley, and had the honour of obtaining their approbation. Newton made him a present of his own portrait, and Halley gave him a copy of the tables which he had published in 1719. He was also created a member of the Royal Society, and he enjoyed similar honours from every literary society in Europe before his death. In 1721 he received an invitation from Peter the Great to go to Petersburgh, to fill the chair of astronomer in the Imperial Academy of Sciences. On the death of that emperor, his successor Catharine renewed the invitation, offering him a considerable pension, of which he accepted, and, in 1726, set out for Petersburgh, accompanied by his brother Lewis and M. Vignon, who were to act as his assistants. He reached Petersburgh in the month of October, and was established in the observatory erected by Peter the Great, which he occupied for 21 years. It was in every respect commodious, but extremely deficient in astronomical apparatus, which his own ingenuity and indefatigable application in a great measure supplied.

A transit of Mercury over the sun's disc was expected in the year 1740, which would not be visible in Europe, and therefore de Lisle undertook a journey to the distant regions of Asia; but after travelling through the inhospitable wilds of Siberia, the cloudiness of the atmosphere prevented him from observing the transit,—a mortification which he endeavoured to support by his geographical and physical remarks, and in drawing up a description of the country. He constructed an interesting map of Russia, assisted by his brother Lewis, who was appointed to make observations in the most distant parts of that immense empire. He was occasionally employed for the long period of forty years, in making meteorological observations, which he executed with an accuracy almost incredible.

After a number of discouragements and difficulties, and the irregular payment of his pension, had been long experienced by de Lisle at Petersburgh, he returned disgusted to his native place, and was chosen professor of mathematics at the college-royal, where he did the most essential service to the sciences, by the important instructions which he gave to his numerous pupils, many of whom became afterwards the most distinguished characters, such as M. M. de la Lande and Messier. Lisle.

When the transit of Mercury over the sun was eagerly expected in 1753 by the greatest astronomers, de Lisle published an interesting map of the world, representing the effect of Mercury's parallaxes in different countries, that such places might be known as were proper for making those observations on the transit as might determine the distance of the sun. As the apparent orbit of the planet traversed nearly the centre of the sun, de Lisle made use of this circumstance to determine the diameter of that luminary. The last work of our author which was inserted in the volumes of the French academy, was a memoir on the comet which appeared in the year 1758, discovered by a peasant in the vicinity of Dresden.

It may perhaps be asserted with justice, that the most important service which this great man rendered to astronomers was, his correction of the double error of Halley respecting the transit of Venus, looked for in the year 1761, as by this means he prevented many learned men from undertaking long voyages in order to observe it. About the year 1754, de Lisle was appointed by the king of France, astronomical geographer to the marine, in which capacity he was to collect plans and journals of naval captains, to arrange them methodically, and to make extracts from them of whatever might be beneficial to the service. About the year 1758 he withdrew into quiet retirement at the abbey of St Genevieve, where much of his time was spent in devotional exercises, and in acts of charity and beneficence. Still, however, he continued to prosecute those studies which had been so dear to him during the earlier part of his life; but in 1768 he was seized with a scorbutic complaint, of which he was cured by his medical friends; but in the month of September the same year he was seized with a species of apoplexy, which carried him off on the 11th day of that month, in the 81st year of his age.

His extraordinary merit as a man of science may in some measure be gathered from this concise account of his life; and as a citizen of the world his piety was unaffected, his morals pure, his integrity undeviating, his spirit generous and disinterested, and his whole manners highly amiable. The only publication of our author's, besides those already mentioned, consisted of "Memoirs illustrative of the History of Astronomy," in two volumes 4to.

Lisle, *Sir John*, a brave loyalist in the time of the civil wars, was the son of a bookseller in London, and received his education in the Netherlands. He signalized himself upon many occasions in the civil war, particularly in the last battle of Newbury; where, in the dusk of the evening, he led his men to the charge in his shirt, that his person might be more conspicuous. The king, who was an eye-witness of his bravery, knighted him on the field of battle. In 1648, he rose for his majesty in Essex; and was one of the royalists who

Lisle, Lismore.

who so obstinately defended Colchester, and who died for the defence of it. This brave man having tenderly embraced the corpse of Sir Charles Lucas, his departed friend, immediately presented himself to the soldiers who stood ready for his execution. Thinking that they stood at too great a distance, he desired them to come nearer: one of them said, "I warrant you Sir, we shall hit you." He replied with a smile, "Friends, I have been nearer you when you have missed me." He was executed August 28. 1648.

LISMORE, one of the Western islands of Scotland, seated at the mouth of Loche Linnhe, an arm of the sea in Argyleshire, navigable for the largest ships to Fort William, which is in the country called Lochaber. This island is 10 miles in length by one in breadth; and contained, in 1811, 1323 inhabitants. It abounds in limestone, which forms a fine loamy and very fertile soil, yielding rich crops of barley. This island was formerly the residence of the bishop of Argyle, from which he was frequently named *Episcopus Lismorensis*. Great part of the cathedral yet remains, and part of it is still employed as the parish church. The bishop's castle stands four miles from the cathedral; the walls are yet pretty entire. There are some vestiges of fortified camps, and an old castle with a ditch and drawbridge, which, it is said, were erected by the Danes.

LISMORE, a borough town of Ireland, in the county of Waterford, and province of Munster, 100 miles from Dublin; N. Lat. 52. 5. W. Long. 7. 50. It was anciently called *Lessmore* or *Lios-more*, i. e. the great enclosure, or habitation; it is now a bishopric, united to Waterford, and formerly had an university. St Carthagh or Mochuda, in the beginning of the seventh century, founded an abbey and school in this place, which in a short time was much resorted to, not only by the natives, but also by the Britons and Saxons, during the middle ages. According to an ancient writer of the life of St Carthagh, Lismore was in general inhabited by monks, half of it being an asylum into which no woman dared enter; consisting entirely of cells and monasteries, the ruins of which, with seven churches, are yet visible. A castle was built here by King John. The site of Lismore was in early ages denominated *magh skia*, or the "chosen shield;" being the situation of a dun or fort of the ancient chieftains of the Decies, one of whom granted it to St Carthagh on his expulsion from the abbey of Ratheny in Westmeath. On becoming an university, Math Sgiath obtained the name of *Dunsginne*, or the "fort of the Saxons," from the number of Saxons who resorted thereto; but soon after, it was called *Lios-more* or *Less-more*, and now *Lismore;* the bishopric of which was united to that of Waterford in 1363, being 730 years after its foundation. The public road to Cork was formerly through this place, and at that time it had a better face of business. St Carthagh, who retired to this place with some of his religious in 636, to avoid the fury of the then Irish monarch, tied his disciples to a most strict rule of life; they never were allowed the use of flesh, fish, or fowl; only the vegetables that the ground produced at the expence of their own labour. Father Daniel, in his *Histoire Monastique*, mentions one on the same foundation in France. The castle here, which, as we have formerly mentioned, was built by King John, was erected in 1195 on the ruins of the abbey of St Carthagh: it belonged to the duke of Devonshire, and gave birth to the great philosopher Robert Boyle. In 1189 it was demolished by the Irish, who took it by surprise. Being afterwards re-edified, it was for many years an episcopal residence, till Myler Magrath, archbishop of Cashel, and bishop of this see, granted the manor of Lismore to that noted scholar and soldier Sir Walter Raleigh, in the reign of Queen Elizabeth, at the yearly rent of 13l. 6s. 8d.; but that estate was lopped off with his head in the reign of King James I. After which it fell into the hands of Sir Richard Boyle, who purchased all Sir Walter's lands; he beautified the whole, and added many buildings to it, most of which were burned down in the Irish rebellion; at the breaking out of which, it was closely beseiged by 5000 Irish commanded by Sir Richard Beling, and was well defended by the young Lord Broghill, third son of the earl of Cork, who obliged them to raise the siege. The castle is boldly seated on the verge of a rocky hill, rising almost perpendicular to a considerable height over the river Blackwater. The entrance is by an ancient and venerable avenue of trees. Over the gate are the venerable arms of the first earl of Cork. Opposite to the entrance is a modern portico of Bath stone, of the Doric order, designed by Inigo Jones. Most of the buildings have remained in ruins since the era of the rebellion; but the several offices that make up two sides of the square are kept in repair. At each angle is a tower, the chief remains of its former magnificence. In October 1785, the late duke of Rutland, then lord-lieutenant of Ireland, whilst on a tour in Munster, held a council in, and issued proclamations from this castle. The cathedral is still pretty well kept in repair. Here is a fine bridge over the river Blackwater, erected at a very great expence by the duke of Devonshire: this bridge is remarkable for the extent of the principal arch, the span of it being 102 feet. Below the town is a rich fishery for salmon, which is the greatest branch of trade here. Though this place is at present much reduced, yet Cambrensis informs us, that, not many years after the conquest, this was a very rich city, and held out some time against the English, who took it at last by storm, and gained rich plunder here, enough to load 16 sail of ships.

Lismore || List.

LISSA, an island in the gulf of Venice, on the coast of Dalmatia, belonging to the Venetians, where they have a fishery of sardines and anchovies. It produces excellent wine, and is 70 miles west of Ragusa. E. Long. 17. 0. N. Lat. 43. 22.

LISSA, a town of Poland, in the palatinate of Posna, of which it is the capital. E. Long. 16. 0. N. Lat. 32. 15.

LISSA, a village of Silesia, 16 miles from Breslau, remarkable for a battle fought between the Prussians and the Austrians on the 15th of December 1757, when the latter were entirely defeated.

LISSUS, in *Ancient Geography*, the last town of Illyricum, towards Macedonia, situated on the Drilo. It had a capacious port, the work of Dionysius the Tyrant, who led the colony thither, enlarged and walled it round, (Diodorus Siculus). Now called *Alessio*, in Albania, on the Drino, near the gulf of Venice. E. Long. 20. N. Lat. 42.

LIST, in commerce, the border of cloth or stuff; serving

List. serving not only to show their quality, but to preserve them from being torn in the operations of fulling, dyeing, &c.—List is used on various occasions; but chiefly by gardeners for securing their wall trees.

List, in *Architecture*, a little square moulding, otherwise called a *fillet*, *listel*, &c. See Architecture.

List, is also used, to signify the enclosed field or ground wherein the ancient knights held their justs and combats. It was so called, as being hemmed round with pales, barriers, or stakes, as with a list. Some of these were double, one for each cavalier: which kept them apart, so that they could not come nearer each other than a spear's length. See Just, Tournament, Duel, &c.

Civil List, in the British polity. The expences defrayed by the civil list are those that in any shape relate to civil government; as, the expences of the household; all salaries to officers of state, to the judges, and every one of the king's servants, the appointments to foreign ambassadors; the maintenance of the queen and royal family; the king's private expences, or privy-purse; and other very numerous outgoings, as secret-service money, pensions, and other bounties: which sometimes have so far exceeded the revenues appointed for that purpose, that application has been made to parliament to discharge the debts contracted on the civil list; as particularly in 1724, when one million was granted for that purpose by the statute 11 Geo. I. c. 17. and, in 1769, when half a million was appropriated to the like uses by the statute 9 Geo. III. c. 34.

Blackst. Comment. The civil list is indeed properly the whole of the king's revenue in his own distinct capacity; the rest being rather the revenue of the public, or its creditors, though collected and distributed again in the name and by the officers of the crown: it now standing in the same place, as the hereditary income did formerly; and as that has gradually diminished, the parliamentary appointments have increased. The whole revenue of Queen Elizabeth did not amount to more than 600,000l. a-year: that of King Charles I. was 800,000l. and the revenue voted for King Charles II. was 1,200,000l. though complaints were made (in the first years at least) that it did not amount to so much. But it must be observed, that under these sums were included all manner of public expences; among which Lord Clarendon, in his speech to the parliament, computed that the charge of the navy and land forces amounted annually to 800,000l. which was ten times more than before the former troubles. The same revenue, subject to the same charges, was settled on King James II.; but by the increase of trade, and more frugal management, it amounted on an average to 1,500,000l. per annum, (besides other additional customs granted by parliament, which produced an annual revenue of 400,000l.), out of which his fleet and army were maintained at the yearly expence of 1,100,000l. After the Revolution, when the parliament took into its own hands the annual support of the forces both maritime and military, a civil list revenue was settled on the new king and queen, amounting, with the hereditary duties to 700,000l. per annum; and the same was continued to Queen Anne and King George I. That of King George II. was nominally augmented to 800,000l. *, and in fact was considerably more: but that of his present majesty is expressly limited to that sum; though 100,000l. hath been since added. And upon the whole, it is doubtless much better for the crown, and also for the people, to have the revenue settled upon the modern footing rather than the ancient. For the crown, because it is more certain, and collected with greater ease; for the people, because they are now delivered from the feudal hardships, and other odious branches of the prerogative. And though complaints have sometimes been made of the increase of the civil list, yet if we consider the sums that have been formerly granted, the limited extent under which it is now established, the revenues and prerogatives given up in lieu of it by the crown, the numerous branches of the present royal family, and (above all) the diminution of the value of money compared with what it was worth in the last century, we must acknowledge these complaints to be void of any rational foundation; and that it is impossible to support that dignity, which a king of Great Britain should maintain, with an income in any degree less than what is now established by parliament. See Revenue.

List || Litana.

* See *Revenue.*

To List or Enlist Soldiers, to retain and enroll men as soldiers, either as volunteers, or by a kind of compulsion. Persons listed must be carried within four days, but not sooner than 24 hours after, before the next justice of peace of any county, riding, city, or place, or chief magistrate of any city or town corporate (not being an officer in the army); and if before such justice or magistrate they dissent from such enlisting, and return the enlisting money, and also 20 shillings in lieu of all charges expended on them, they are to be discharged. But persons refusing or neglecting to return and pay such money within 24 hours, shall be deemed as duly listed as if they had assented thereto before the proper magistrate; and they shall, in that case, be obliged to take the oath, or, upon refusal, they shall be confined by the officer who listed them till they do take it.

LISTER, Dr Martin, an eminent English physician and naturalist, was born in 1638, and educated at Cambridge. He afterwards travelled into France; and at his return practised physic at York, and afterwards at London. In 1683, he was created doctor of physic, and became fellow of the College of Physicians in London. In 1698, he attended the earl of Portland in his embassy from King William III. to the court of France; of which journey he published an account at his return, and was afterwards physician to Queen Anne. He also published, 1. *Historia animalium, Angliæ*, quarto. 2. *Conchyliorum synopsis*, folio. 3. *Cochlearum et limachum exercitatio anatomica*, 4 vols. 8vo. 4. Many pieces in the Philosophical Transactions; and other works.

LISTOWEL, a parish, also a post and fair town, of Ireland, in the county of Kerry and province of Munster, 131 miles from Dublin, anciently *Lis Tuathal*, i. e. "the fort of Tuathal," who was exiled in the first century, but returned; and his life forms a brilliant era in Irish history. Near this are the ruins of a castle, pleasantly situated on the river Feale: it was taken in November 1600, by Sir Charles Wilmot, being then held out for Lord Kerry against Queen Elizabeth. Five miles beyond Listowel are the ruins of a church. The fairs are three in the year.

LITANA silva, in *Ancient Geography*, a wood

Litana || Litchfield.

of the Boii, in Gallia Togata, or Cispadana, where the Romans, under L. Posthumius Albinus (whose head the Boii cut off, and carried in triumph into their most sacred temple), had a great defeat; of twenty-five thousand, scarcely ten escaping (Livy). Holstenius conjectures, that this happened above the springs of the Scultenna, in a part of the Appennine, between Cersinianum and Mutina. Now Selva di Lugo.

LITANY, a solemn form of supplication to God, in which the priest utters some things fit to be prayed for, and the people join in their intercession, saying *we beseech thee to hear us, good Lord*, &c. The word comes from the Greek λίτανεια "supplication;" of λίτανεύω, 'I beseech."

At first the use of litanies was not fixed to any stated time, but were only employed as exigencies required. They were observed, in imitation of the Ninevites, with ardent supplications and fastings, to avert the threatening judgments of fire, earthquakes, inundations, or hostile invasions. About the year 400, litanies began to be used in processions, the people walking barefoot, and repeating them with great devotion; and it is pretended, that by this means several countries were delivered from great calamities. The days on which these were used were called *rogation days*: these were appointed by the canons of different councils, till it was decreed by the council of Toledo, that they should be used every month throughout the year; and thus by degrees they came to be used weekly on Wednesdays and Fridays, the ancient stationary days for fasting. To these days the rubric of our church has added Sundays, as being the greatest days for assembling at divine service. Before the last review of the comunon prayer, the litany was a distinct service by itself, and used some time after the morning prayer was over; at present it is made one office with the morning service, being ordered to be read after the third collect for grace, instead of the intercessional prayers in the daily service.

LITCHFIELD, a city of Staffordshire, in England, 117 miles from London. It stands low, about three miles from the Trent: and its ancient name is said to have been *Licidfield*, signifying, "a field of carcasses," from a great number of Christians having, as it is pretended, suffered martyrdom here in the persecution under Dioclesian, In the Saxons time, it was a bishoprick for a short space; and is now, together with Coventry, a bishoprick. It is divided into two parts by a rivulet and a kind of shallow lake, over which are two causeways with sluices. It is a long straggling place; but has some very handsome houses, and well paved clean strects. That part on the south side of the rivulet is called the *city*, and the other the *close*. The *city* is much the largest, and contains several public structures. It was incorporated by Edw. VI. with the name of bailiffs and burgesses; and is both a town and county, governed by 2 bailiffs chosen yearly out of 24 burgesses, a recorder, a sheriff, a steward, and other officers. The city has power of life and death within their jurisdiction, a court of record, and a piepowder court. Here is a goal both for debtors and felons, a free school, and a pretty large well endowed hospital, for a master and 12 brethren. The county of the city is 10 or 12 miles in compass, which the sheriff rides yearly on the 8th of September, and then feasts the corporation and neighbouring gentry. The *close* is so called from its being enclosed with a wall and a deep dry ditch on all sides except towards the city, where it is defended by a great lake or marsh formed by its brook. The cathedral, which stands in the close, was originally built by Oswius king of Northumberland about 300. It was rebuilt and enlarged by Offa king of Mercia in 766. In 1148 it was rebuilt, and greatly enlarged in 1296. In the civil wars its spire was destroyed, and it converted to a stable. In 1776 a beautiful painted window, by the benefaction of Dr Adenbrook, was set up at the western end of the cathedral. In the civil wars it was several times taken and retaken, and thereby suffered much; but was so repaired after the Restoration, at the expence of 20,000l. that it was one the fairest and noblest structures of the kind in England. It is walled in like a castle, and stands so high as to be seen 10 miles round. It is 450 feet long, of which the choir is 110, and the breadth in the broadest place 80. Its portico is hardly to be paralleled in England. There were, till lately, 26 statues of the prophets, apostles, kings of Judah, and some kings of this land, in a row above it, as big as the life; and on the top, at each corner of the portico, is a stately spire, besides a fine high steeple on the middle of the church. The choir is paved in great part with alabaster and cannel coal, in imitation of black and white marble. In 1789 it underwent a general repair, when the massive groined arch betwixt the west end of the church and the transept, which had forced the side wall out of its perpendicular, was removed. The prebendaries stalls, which are thought to be the best in England, were most of them re-erected at the charge of the country gentlemen, whose names and arms are painted at the top of the stalls. The north door is extremely rich in sculpture, but much injured by time. The body which is supported by pillars formed of numbers of slender columns, has lately had its decayed leaden roof replaced by a neat slated covering. The choir merits attention on account of the elegant sculpture about the windows, and the embattled gallery that runs beneath them; to which the altarpiece of Grecian architecture but ill corresponds; behind which is Mary's chapel, divided from it by a most elegant stone skreen of beautiful workmanship. Here stood St Chad's shrine, which cost 200l. The charter house is an octagon room. In the same close are the palaces of the bishop and dean, and the prebendaries houses in a court on the hill. Here are three other churches; one of which, St Michael's, has a churchyard of 6 or 7 acres. There was a castle here, long since destroyed: and ancient camps have been discovered in its environs. In the neighbourhood are frequent horse races. The markets here are on Tuesday and Friday, and six fairs in the year. By inland navigation, this place has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c.; which navigation, including its windings, extends above 500 miles in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Chester, Warwick, Leicester, Oxford, Worcester, &c. Litchfield

Litchfield.

end

Litchfield sends two members to parliament. The population in 1811 was 5,022.

Literature. LITERARY, any thing belonging to LITERATURE.

LITERARY Property, or *Copy Right*. See *COPY Right*.

LITERATI (*letrados*, "lettered"), an epithet given to such persons among the Chinese as are able to read and write their language. The literati alone are capable of being made mandarins.

LITERATI, is also the name of a particular sect either in religion, philosophy, or politics, consisting principally of the learned men of that country; among whom it is called *jukiao*, i. e. "learned."

It had its rise in the year of Christ 1400, when the emperor, to awaken the native affection of the people for knowledge, which had been quite banished by the preceding civil wars among them, and to stir up emulation among the mandarins, chose out 42 of the ablest among the doctors, to whom he gave a commission to compose a body of doctrine agreeable to that of the ancients, which was then become the rule or standard of the learned. The delegates applied themselves to the business with very great attention: but some fancied them rather to have wrested the doctrine of the ancients, to make it consist with theirs, than to have built up theirs on the model of the ancients.

They speak of the Deity, as if it were no more than mere nature or the natural power or virtue that produces, disposes, and preserves, the several parts of the universe. It is, say they, a pure, perfect principle, without beginning or end; it is the source of all things, the essence of every being, and that which determines it to be what it is. They make God the soul of the world; they say, he is diffused through all matter, and produces all the changes that happen there. In short, it is not easy to determine, whether they resolve God into nature, or lift up nature into God; for they ascribe to it many of those things which we attribute to God.

This doctrine, in lieu of the idolatry that prevailed before, introduced a refined kind of atheism. The work, being composed by so many persons of learning and parts, and approved by the emperor himself, was received with infinite applause by all the people. Many were pleased with it, because it seemed to subvert all religion; others approved it, because the little religion that it left them could not give them much trouble. And thus was formed the sect of the Literati: which consists of the maintainers and adherents to this doctrine.

The court, the mandarins, and the persons of fortune and quality, &c. are generally retainers to it; but a great part of the common people still hold to their worship of idols.

The literati freely tolerate the Mahometans, because they adore, with them, the King of heaven, and Author of nature; but they bear a perfect aversion to all sorts of idolaters among them: and it was once resolved to extirpate them. But the disorder this would have occasioned in the empire prevented it; they now content themselves with condemning them, in general, as heresies: which they do solemnly every year at Pekin.

LITERATURE denotes learning or skill in letters.

LITERNUM. See LINTERNUM.

Liternum Lithomantia. LITHANTHRAX, or *PIT-Coal*, is a black or brown, laminated, bituminous substance; not very easily inflammable, but, when once inflamed, burns longer and more intensely than any other substance. See MINERALOGY *Index*.

LITHARGE, a preparation of lead, usually in form of soft flakes, of a yellowish reddish colour. If calcined lead be urged with a hasty fire, it melts into the appearance of oil, and on cooling concretes into litharge. Greatest part of the litharge met with in the shops is produced in the purification of silver from lead, and the refining of gold and silver by means of this metal: according to the degree of fire and other circumstances, it proves of a pale or deep colour: the first has been commonly called *litharge of silver*, the other *litharge of gold*. See LEAD, CHEMISTRY *Index*.

LITHGOW, WILLIAM, a Scotsman, whose sufferings by imprisonment and torture at Malaga, and whose travels, on foot, over Europe, Asia, and Africa, seem to raise him almost to the rank of a martyr and a hero, published an account of his peregrinations and adventures. Though the author deals much in the marvellous, the horrid account of the strange cruelties of which he tells us, he was the subject, have however, an air of truth. Soon after his arrival in England from Malaga, he was carried to Theobald's on a feather-bed, that King James might be an eye-witness of his *martyred anatomy*, by which he means his wretched body, mangled and reduced to a skeleton. The whole court crowded to see him; and his majesty ordered him to be taken care of, and he was twice sent to Bath at his expence. By the king's command he applied to Gondamor, the Spanish ambassador, for the recovery of the money and other things of value which the governor of Malaga had taken from him, and for 1000l. for his support. He was promised a full reparation for the damage he had sustained: but the perfidious minister never performed his promise. When he was upon the point of leaving England, Lithgow upbraided him with the breach of his word in the presence-chamber, before several gentlemen of the court. This occasioned their fighting upon the spot; and the ambassador, as the traveller oddly expresses it, had his fistula (with which disorder he was afflicted) contrabanded with his fist. The unfortunate Lithgow, who was generally condemned for his spirited behaviour, was sent to the Marshalsea, where he continued a prisoner nine months. At the conclusion of the octavo edition of his *Travels* he informs us, that, in his three voyages, "his painful feet have traced over (besides passages of seas and rivers) 36,000 and odd miles, which draweth near to twice the circumference of the whole earth." Here the marvellous seems to rise to the incredible; and to set him, in point of veracity, below Coryat, whom it is nevertheless certain that he far outwalked. His description of Ireland is whimsical and curious. This, together with the narrative of his sufferings, is reprinted in Morgan's *Phœnix Britannicus*.

LITHIASIS, or STONE. See MEDICINE *Index*.

LITHOMANTIA, in antiquity, a species of divination performed with stones. Sometimes the stone called *siderites* was used: this they washed in spring-water in the night by candle-light; the person that consulted

Lithomantia || Lithuania.

consulted it was to be purified from all manner of pollution, and to have his face covered: this done, he repeated divine prayers, and placed certain characters in an appointed order; and then the stone moved of itself, and in a soft gentle murmur, or (as some say) in a voice like that of a child, returned an answer. By a stone of this nature, Helenus is reported to have foretold the destruction of Troy.

LITHONTRIPTICS (from λιθος, "a stone," and θρυπτω, "to break"); an epithet for medicines that are supposed to break the stone in the bladder. Though the different stones that are generated in the human bladder require different solvents when out of the body; and though art hath not yet afforded a medicine which, when injected into the bladder, will, without injury thereto, dissolve the stone therein lodged; it cannot thence be concluded, that there are no lithontriptic medicines. It may be here observed, that one solvent affects one subject, but hath no effect on another; so a solvent may yet be met with that will destroy the stone, and not hurt the human body. The water into which the boiled white of egg dissolves will liquefy myrrh, but may be put into the human eye without causing any uneasiness.

Soap ley taken at first in small doses in broth that is freed from all its fat, succeeds in most cases which require an alkaline solvent. The patient may begin with 20 drops, and gradually increase the dose as he is able; and by repeating it three times a-day for six, eight, or twelve months, the wished-for effects often follow.

LITHOPHYTA, the name of Linnæus's third order of vermes. See HELMINTHOLOGY *Index*.

LITHOSPERMUM, GROMWELL, a genus of plants belonging to the pentandria class; and in the natural method ranking under the 41st order, *Asperifoliæ*. See BOTANY *Index*.

LITHOSTROTON, among the Romans, was a pavement of mosaic work, consisting of small pieces of cut marble of different kinds and colours, first used in the time of Sylla, who made one at Præneste in the temple of Fortune, and afterwards in private houses; and were brought to such perfection, that they exhibited most lively representations of nature with all the accuracy of the finest painting.

LITHOTOMY, in *Surgery*, the operation of cutting for the stone. See SURGERY *Index*.

LITHUANIA, an extensive province of Poland. By the natives it is called *Letwa*, and has Great Poland and Russia on the west; part of Muscovy on the east; Livonia, the Baltic sea, and part of Muscovy, on the north; Red Russia, Volhinia, and Podolia, on the south; and the Ukraine on the south-east. Its length is said to be about 360, and its breadth 340 miles; but it is much indented both ways. Lithuania was anciently overrun with wood; and there are still many forests in it, which yield a great deal of honey, wax, pitch, tar, and timber; and abound with wild boars, buffaloes, elks, wild horses, wild asses, uri, and woodcocks. The lakes are also numerous, and well stored with fish: but the air, by reason of these forests and lakes, is said to be thick and foggy. The country produces a great deal of buck wheat and other corn; the pastures are luxuriant, and the flocks and herds numerous: so that, notwithstanding agriculture is much neglected, provisions are exceeding cheap, and money so scarce, that 10 per cent. is the common interest. The principal nobility have large estates, and live in great pomp and splendour, generally retaining some hundreds of those that are poor, in quality of domestics. The established religion is Popery; but Lutherans, Calvinists, Jews, Turks, Greeks, and Socinians, are very numerous. Lithuania was governed by its own dukes till it was united to Poland, towards the end of the 14th century, when the great duke Jagello married Hedwig, the dowager of Louis king of Poland and Hungary. It had even dukes after that, but they were subordinate to the king; and at this day, though one diet serves for both countries, yet each has its peculiar laws, customs, dialect, and privileges. In a diet held at Lubin in 1569, it was enacted, that both countries, for the future, should form but one state under the same prince. As to their courts of justice, the tenth part of what is adjudged in all real actions goes always to the judge's box, and is immediately paid in court; and in personal actions he claims half the damages given. A nobleman is only fined for murder, as in Poland. The dialect is a language of the Selavonic; and they speak here, as in Poland, a barbarous kind of Latin. Lithuania was divided into nine palatinates. In 1772 the Poles were compelled to cede a part of this province to Russia; and at the partition in 1793, this power acquired nearly the whole. In 1815 the kingdom of Poland was revived, the crown being united to that of Russia, but the part of Lithuania formerly disjoined from this kingdom still continues annexed to Russia.

Lithuania || Litter.

LITMUS, or LACMUS, in the arts, is a blue pigment, formed from *archil*. It is brought from Holland at a cheap rate: but may be prepared by adding quicklime and putrified urine, or spirit of urine distilled from lime, to the archil previously bruised by grinding. The mixture having cooled, and the fluid suffered to evaporate, becomes a mass of the consistence of a paste, which is laid on boards to dry in square lumps. It is only used in miniature paintings, and cannot be well depended on, because the least approach of acid changes it instantly from blue to red. The best litmus is very apt to change and fly.

LITTER (*lectica*), a kind of vehicle borne upon shafts; anciently esteemed the most easy and genteel way of carriage. Du Cange derives the word from the barbarous Latin *lecteria*, "straw or bedding for beasts." Others will rather have it come from *lectus*, "bed." Pliny calls the litter the *traveller's chamber*; it was much in use among the Romans, among whom it was borne by slaves kept for that purpose; as it still continues to be in the east, where it is called a *palanquin*.—The Roman lectica, made to be borne by four men, was called *tetraphorum*; that borne by six, *hexaphorum*; and that borne by eight, *octaphorum*.

The invention of litters, according to Cicero, was owing to the kings of Bithynia; in the time of Tiberius they were become very frequent at Rome, as appears from Seneca; and even slaves themselves were borne in them, though never by more than two persons, whereas men of quality had six or eight.

LITTER also denotes a parcel of dry old straw put on the floor of a horse's stall for him to lie down and rest upon. When a horse comes tired into a stable, fresh

Litter || Liturgy.

litter has the virtue of making him stale immediately. This is known to be of very great advantage to a horse in a tired state; and when the litter is old and dirty, it never has any such effect upon him. If the owners knew how refreshing it is for a horse to discharge his urine on his return from labour, they would be more careful of giving them all means and occasions of it than they are. This staling after fatigue prevents those obstructions in the neck of the bladder or urinary passages which horses are too subject to.

LITTLETON, Sir Thomas, judge of the common pleas, was the eldest son of Thomas Westcote, Esq. of the county of Devon, by Elizabeth, sole heiress of Thomas Littleton of Frankley in Worcestershire, at whose request he took the name and arms of that family. He was educated at one of our universities, probably at Cambridge. Thence he removed to the Inner-Temple, where he became one of the readers; and was afterwards, by Henry VI. made steward or judge of the court of the palace, or marshalsea of the king's household. In 1455, the thirty-third of that reign, he was appointed king's serjeant, and rode the northern circuit as judge of assize. In 1462, the second of Edward IV., he obtained a pardon from the crown; and, in 1466, was appointed one of the judges of the common pleas, and rode the Northamptonshire circuit. In the year 1474 he was, with many of the first nobility, created knight of the Bath. He died in 1481; and was buried in the cathedral church of Worcester, where a marble tomb, with his statue upon it, was erected to his memory. As to his character as a lawyer, it is sufficient to inform the reader, that he was the author of the Treatise upon tenures, on which Sir Edward Coke wrote a comment, well known by the title of *Coke upon Littleton*.

Littleton, *Adam*, descended from an ancient family in Shropshire, was born in 1627, educated at Westminster school, and went to Oxford a student of Christ-church, whence he was ejected by the parliament visitors in 1648. Soon after, he became usher of Westminster school, and in 1658 was made second master of Westminster school. After the Restoration he taught a school at Chelsea in Middlesex, of which church he was admitted rector in the year 1664. In 1670 he accumulated the degrees in divinity, being then chaplain in ordinary to his majesty. In 1674, he became prebendary of Westminster, of which church he was afterwards sub-dean. Beside the well-known *Latin* and *English* Dictionary, he published several other works. He died in 1694, and was interred at Chelsea. He was an universal scholar; and extremely charitable, humane, and easy of access.

LITURGY, denotes all the ecremonies in general belonging to divine service.

The word comes from the Greek λειτουργια, "service, public ministry;" formed of λειτος, "public," and εργον, "work."

In a more restrained signification, liturgy is used among the Romanists to signify the *mass;* and among us the *common prayer*.

All who have written on liturgies agree, that in the primitive days divine service was exceedingly simple, only clogged with a very few ceremonies, and consisting of but a small number of prayers; but, by degrees, they increased the number of external ceremonies, and added new prayers, to make the office look more awful and venerable to the people. At length things were carried to such a pitch, that a regulation became necessary; and it was found proper to put the service, and the manner of performing it, into writing; and this was what they called a *liturgy*.

Liturgy, Lituus.

Liturgies have been different at different times, and in different countries. We have the liturgy of St Chrysostom, that of St Peter, of St James, the liturgy of St Basil, the Armenian liturgy, the liturgy of the Maronites, of the Cophtæ, the Roman liturgy, the Gallican liturgy, the English liturgy, the Ambrosian liturgy, the Spanish and African liturgies, &c.

In the more early ages of the church, every bishop had a power to form a liturgy for his own diocese; and if he keep to the analogy of faith and doctrine, all circumstances were left to his own discretion. Afterwards the practice was for the whole province to follow the metropolitan church, which also became the general rule of the church: and this Lindwood acknowledges to be the common law of the church; intimating, that the use of several services in the same province, which was the case in England, was not to be warranted but by long custom. The liturgy of the church of England was composed in the year 1547, and established in the second year of King Edward IV. stat. 2. and 3. Ed. VI. cap. 1.

In the fifth year of this king it was reviewed; because some things were contained in that liturgy which showed a compliance with the superstition of those times, and some exceptions were taken against it by some learned men at home, and by Calvin abroad. Some alterations were made in it, which consisted in adding the general confession and absolution, and the communion to begin with the ten commandments. The use of oil in confirmation and extreme unction was left out, and also prayers for souls departed, and what tended to a belief of Christ's real presence in the eucharist. This liturgy, so reformed, was established by the act of 5 and 6 Ed. VI. cap. 1. However, it was abolished by Queen Mary, who enacted that the service should stand as it was most commonly used in the last year of the reign of King Henry VIII. The liturgy of 5 and 6 Ed. VI. was re-established with some few alterations and additions, by 1 Eliz. cap. 2. Some farther alterations were introduced, in consequence of the review of the common-prayer book, by order of King James, in the first year of his reign; particularly in the office of private baptism, in several rubrics and other passages, with the addition of five or six new prayers and thanksgivings, and all that part of the catechism which contains the doctrine of the sacraments. The book of common-prayer, so altered, remained in force from the first year of King James to the fourteenth of Charles II. But the last review of the liturgy was in the year 1661, and the last act of uniformity enjoining the observance of it is 13 and 14 Car. II. cap. 4. See *Common-Prayer*. Many applications have been since made for a review, but hitherto without success.

LITUUS, among the Romans, was the staff made use of by the augurs in quartering the heavens. It bore a great resemblance to the crosier of a bishop, but was shorter. It was crooked at one end, and thickest

in

Lituus || Liver.

in the curved part, according to A. Gellius. We frequently meet with a representation of it upon medals, amongst other pontifical instruments. It was called *Lituus Quirinalis*, from Quirinus, a name of Romulus, who was skilled in all the mysteries of augury.

LITUUS, was also an instrument of music in use in the Roman army. It was straight, excepting that it had a little bending at the upper end like a lituus or sacred staff of the augurs; and from the similitude it derived its name.

LIVADIA, anciently *Achaia* and *Hellas*, or *Greece* properly so called; a province of Turkey in Europe, bounded on the north by Epirus and Thessaly, from which it is separated by Mount Oëta, now Banina, and by the Euripus, now the strait of Negropont; on the east, by the Archipelago; on the south, by the gulf of Engia or Egina, the isthmus of Corinth, and the gulf of Lepanto; and on the west, by the Ionian sea and part of Epirus. Its extent is about 130 miles from north-west to south-east; but its greatest breadth is not above 36 miles. It is in general a mountainous country; but neither unpleasant nor unfruitful. The principal mountains are, Mount Oëta in Bœotia, where is the famous pass of Thermopylæ, not above 25 feet broad; and Parnassus, Helicon, and Cythæron in Phocis, which were sacred to Apollo and the muses, and consequently much celebrated by the poets. The rivers of most note are, the Sionapro, anciently the Achelous, the Cephissus, the Ismenus, and the Asopus. This province is at present divided into Livadia proper, Stramulippa, and the duchy of Athens. The principal places are, Lepanto, anciently Naupactus; Livadia, anciently Libadia or Lebadia; the celebrated city of Athens, now Setines; Thebes, now Stibes; Lepsina, anciently Eleusis; Castri, formerly Delphi; and Megara.

LIVADIA, an ancient town of Turkey in Europe, and capital of a province of the same name in Greece. It is a large and populous place, seated on the gulf of Lepanto, about 25 miles from the city of that name. It has now a considerable trade in woollen stuffs and rice. Anciently it was celebrated for the oracle of Trophonius, which was in a cavern in a hill above the town. E. Long. 23. 29. N. Lat. 38. 40.

LIVER, see ANATOMY, N° 96.—Plato, and others of the ancients, fix the principle of love in the liver; whence the Latin proverb, *Cogit amare jecur:* and in this sense Horace frequently uses the word, as when he says, *Si torrere jecur quærus Idoneum.* The Greeks, from its concave figure, called it ἧπαρ, "vaulted, suspended;" the Latins call it *jecur*, q. d. *juxta cor*, as being "near the heart." The French call it *foye*, from *foyer*, *focus*, or "fireplace;" agreeable to the doctrine of the ancients, who believed the blood to be boiled and prepared in it.—Erasistratus, at first, called it *parenchyma*, i. e. *effusion*, or *mass of blood;* and Hippocrates, by way of eminence, frequently calls it the *hypochondrium.*

Liver of Antimony. See CHEMISTRY *Index.*

Liver of Arsenic, is a combination of white arsenic with potash. See ARSENIC, CHEMISTRY *Index.*

Liver of Sulphur. See *Potash, Sulphuret of*, CHEMISTRY *Index.*

Liver-Wort. See MARCHANTIA and LICHEN, BOTANY *Index.* Liver. Liverpool.

LIVERPOOL, a large, flourishing, and populous town of England, in the county of Lancaster, situated at the influx of the river Mersey into the sea, in North Lat. 53. 24. and West Long. 2. 50. This town was of little importance till the end of the 17th century, but from that time it has increased with extraordinary rapidity. In 1699 the population was about 5000, and in 1710, when the first wet dock was constructed, there were about 84 ships belonging to the port, averaging 70 tons and 11 men each. In 1720 an act was procured for opening an inland navigation with Manchester, and for improving the water communication with the Cheshire salt mines, both of which have been of immense advantage to Liverpool. In 1764 the population was 26,000, in 1790 it was 56,000, in 1801 it was 77,600, and in 1811 it was 94,376, exclusive of 7000 sailors. In 1793 she possessed 92,098 tons of shipping. In the year, ending 5th July 1818, the number of ships that entered the port amounted to 6779, the tonnage to 754,690. The dock duties, which in 1724 amounted to 810l. 11s. 6d., were 76,915l. 8s. 8d. in 1815, when the official value of the imports was 8,000,000l. sterling, and of the exports 12,000,000l. In 1818 the dock duties amounted to 98,538l. 8s. 3d. It is by far the greatest sea-port in Britain, except London. It has been estimated that one twelfth of the shipping of Great Britain is furnished by Liverpool; that it has one fourth of her foreign trade, and one sixth of her general commerce; and that its exports and imports amount to not less than one half of those of London.

The Liverpool merchants have engaged eagerly in the trade to India since it was thrown open. One vessel was sent out in 1815; next year there were eight vessels in the trade; in 1817 they were increased to 17, with a tonnage of 7538; and from the commencement to September 1818, no fewer than 80 vessels have been employed in the Indian trade. The exports in this trade are chiefly broad cloths and woollens, Birmingham hardware and Sheffield cutlery, Manchester and Glasgow piece goods, Nottingham hosiery, Staffordshire earthen ware, Irish linens, iron, copper, lead, salt, glass, hats, malt liquors, and dollars. The imports are cotton, rice, indigo, sugar, saltpetre, ginger, pimento, and other spices, turmeric, safflower, and other dyes.

The docks of Liverpool are upon a very extensive scale. When the new one begun in 1816 is finished, the total space occupied by the whole will exceed 60 acres. They communicate with one another by tunnels, by which means the water of one is made to wash out the others, and carry off the mud. Along the docks are extensive warehouses, into which goods are removed from the ships with great ease.

There are few manufactories in Liverpool. The most considerable are those for articles connected with the shipping, such as cordage. There is also an extensive pottery, some salt-works, glass-houses, and upwards of 50 breweries, from some of which large quantities of malt liquor are sent abroad. Many of the buildings are elegant; but the old streets are narrow; which defect will soon be removed, as the

Liverpool. corporation have lately obtained an act of parliament for the improvement of the town, which they have already begun to put in force with great spirit, having taken down the principal streets in the centre of the town, and rebuilt them in a spacious and most magnificent manner; so that in a few years it will be one of the handsomest towns in England. This town contains sixteen churches, namely, St Peter's, St Nicholas's, St George's, St Thomas's, St Paul's, St Ann's, St John's, Trinity, St James's, St Catherine's, St Mary's, St Stephen's, St Matthew's, St Mark's, Christ Church, and All Saints. There are also meetings for independents, anabaptists, quakers, methodists, and presbyterians. The exchange is a noble structure, built of white stone in the form of a square, and round it are piazzas where the merchants assemble to transact business. Its area is twice the extent of that of London. Above it are the mayor's offices, the sessions-hall, the council-chamber, and two elegant ball-rooms. The expence of erecting this building amounted to nearly 100,000l. In its centre is a superb group of bronze statuary, representing the death of Nelson. The custom-house is situated at the head of the old dock, and is a handsome and convenient structure. Here are many charitable foundations, among which is an excellent grammar school well endowed, and many of the youth taught in it have exhibitions in the universities. The infirmary is a large edifice of brick and stone, situated on a hill in a very pleasant airy situation, at one end of the town. Above 1500 patients are admitted annually.

In the town is a charity-school, supported by voluntary subscriptions and contributions, for 50 boys and 12 girls, who are not only clothed and educated, but also provided with food and lodging: likewise several alms houses for the widows of seamen; and an excellent poor-house, superior to any in the kingdom, where upwards of 800 men, women, and children, are supported, many of whom are employed in spinning cotton and wool. The new prison is a noble edifice, and upon a very extensive scale. It is built entirely on the plan of the great and benevolent Mr Howard, for solitary confinement; and is perhaps the most convenient, airy, magnificent building of the kind of Europe.

Liverpool received its charter from King John; but it was a borough by prescription long before his reign. It is under the government of a recorder, mayor, and an unlimited number of aldermen, two bailiffs, and a common council of forty of the principal inhabitants, with a town-clerk and other proper officers. The town has a weekly market on Saturday, and is distant from London 204 miles. The income of the corporation is not less than L.60,000 a-year. It sends two members to parliament, who are chosen like the magistrates, by the votes of all the free burgesses not receiving alms. The number who polled at the general election in 1818 was 2905.

By means of inland navigation, Liverpool has communication with the rivers Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c.; which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c. The Mersey, upon which the town is situated, abounds with salmon, cod, flounders, turbot, plaice, and smelts; and at full sea it is above two miles over. Fresh water is brought into the town by pipes, from some springs four miles off, pursuant to an act of parliament in the reign of Queen Anne. The dispensary of this town does honour to human nature, and has been of the most singular advantage to the afflicted, since 172,273 diseased persons were cured between the years 1778 and 1794, being on an average about 10,000 persons every year. The Union News Room was instituted on the 1st of January 1801; the Lyceum much about the same period, the erection of which cost the sum of 11,000l. and the Commercial News Room in 1803. The Liverpool institution for the promotion of science, literature, and the arts, was founded in 1817. The institution for restoring drowned persons is worthy of notice, as more than 400 people have become objects of it since it was founded, and more than one half of that number have been restored. The Athenæum, which comprises a news room and library, was projected in 1798, and finished before the close of the year. There are four weekly papers published at Liverpool. Liverpool || Livius.

LIVERY, in matters of dress and equipage, a certain colour and form of dress, by which noblemen and gentlemen choose to distinguish their servants.

Liveries are usually taken from fancy, or continued in families by succession. The ancient cavaliers, at their tournaments, distinguished themselves by wearing the liveries of their mistresses: thus people of quality make their domestics wear their livery.

Father Menestrier, in his Treatise of Carousals, has given a very ample account of the mixtures of colours in liveries. Dion tells us, that Oenomaus was the first who invented green and blue colours, for the troops which, in the circus, were to represent land and sea fights.

The Romish church has also her several colours and liveries; white, for confessors and virgins, and in times of rejoicing; black, for the dead; red, for the apostles and martyrs; blue or violet, for penitents; and green, in times of hope.

Formerly, great men gave liveries to several, who were not of their family or servants, to engage them in their quarrels for that year; but this was prohibited by the statutes 1 Rich. II. 1 Hen. IV. cap. 27. 2 and 7 Hen. IV. 8 Hen. VI. cap. 4. 8 Ed. IV. cap. 2.; and no man, of whatever condition, was allowed to give any livery, but to his domestic officers, and counsel learned in the law. However, most of the above statutes are repealed by 3 Car. I. cap. 4.

Livery of Seisin, in *Law*, signifies delivering the possession of lands, &c. to him who has a right to them.

LIVERYMEN of London, are a number of men chosen from among the freemen of each company. Out of this body the common-council, sheriff, and other superior officers for the government of the city, are elected; and they alone have the privilege of giving their votes for members of parliament, from which the rest of the citizens are excluded.

LIVIUS, Titus, the best of the Roman historians, as he is called by Mr Bayle, was born at Patavium or Padua. Few particulars of his life have been handed

Livius. handed down to us. Coming to Rome, he acquired the notice and favour of Augustus, and there he long resided. Some have supposed, (for there is not any proof of it), that he was known to Augustus before, by certain Philosophical Dialogues which he had dedicated to him. Seneca says nothing of the dedication: but mentions the dialogues, which he calls historical and philosophical; and also some books, written purposely on the subject of philosophy. Be this as it will, it is probable that he began his history as soon as he was settled at Rome; and he seems to have devoted himself so entirely to the great work he had undertaken, as to be perfectly regardless of his own advancement. The tumults and distractions of Rome frequently obliged him to retire to Naples; not only that he might be less interrupted in the pursuit of his destined task, but also enjoy that retirement and tranquillity which he could not have at Rome, and which yet he seems to have much sought after: for he was greatly dissatisfied with the manners of his age, and tells us, that "he should reap this reward of his labour, in composing the Roman history, that it would take his attention from the present numerous evils, at least while he was employed upon the first and earliest ages." He used to read parts of this history, while he was composing it, to Mecænas and Augustus; and the latter conceived so high an opinion of him, that he pitched upon him to superintend the education of his grandson Claudius, who was afterwards emperor. After the death of Augustus, Livy returned to the place of his birth, where he was received with all imaginable honour and respect: and there he died, in the fourth year of the reign of Tiberius, aged above seventy. Some say, he died on the same day with Ovid: it is certain that he died the same year.

Scarce any man was ever more honoured, alive as well as dead, than this historian. Pliny the younger relates, that a native gentleman travelled from Gades, in the extremest parts of Spain, to see Livy: and, though Rome abounded with more stupendous and curious spectacles than any city in the world, yet he immediately returned: as if, after having seen Livy, nothing farther could be worthy of his notice. A monument was erected to this historian in the temple of Juno, where was afterwards founded the monastery of St Justina. There, in 1413, was discovered the following epitaph upon Livy: *Ossa Titi Livii Patavini, omnium mortalium judicio digni, cujus prope invicto calamo invicti populi Romani res gestæ conscriberentur;* that is, "the bones of Titus Livius of Patavium, a man worthy to be approved by all mankind, by whose almost invincible pen the acts and exploits of the invincible Romans were written." These bones are said to be preserved with high reverence to this day, and are shown by the Paduans as the most precious remains. In 1451, Alphonsus, king of Arragon, sent his ambassador, Anthony Panormita, to desire of the citizens of Padua the bone of that arm with which this their famous countryman had written his history; and, obtaining it, caused it to be conveyed to Naples with the greatest ceremony as a most invaluable relic. He is said to have recovered from an ill state of health by the pleasure he found in reading this history: and therefore, out of gratitude, put upon doing extraordinary honours to the memory of the writer. Panormita also who was a native of Palermo in Sicily, and one of the ablest men of the 15th century, sold an estate to purchase this historian. Livius.

The history of Livy, like other great works of antiquity, is transmitted down to us exceedingly mutilated and imperfect. Its books were originally a hundred and forty-two, of which are extant only thirty-five. The epitomes of it, from which we learn their number, all remain, except those of the 136th and 137th books. Livy's books have been divided into decades, which some will have to have been done by Livy himself, because there is a preface to every decade; while others suppose it to be a modern contrivance, since nothing about it can be gathered from the ancients. The first decade, beginning with the foundation of Rome, is extant, and treats of the affairs of 460 years. The second decade is lost; the years of which are seventy-five. The third decade is extant, and contains the second Punic war, including eighteen years. It is reckoned the most excellent part of the history, as giving an account of a very long and sharp war, in which the Romans gained so many advantages, that no arms could afterwards withstand them. The fourth decade contains the Macedonian war against Philip, and the Asiatic war against Antiochus, which take up the space of about 23 years. The five first books of the fifth decade were found at Worms, by Simon Grynæus, in 1431, but are very defective; and the remainder of Livy's history, which reaches to the death of Drusus in Germany in 746, together with the second decade, are supplied by Freinshemius.

Never man perhaps was furnished with greater advantages for writing a history than Livy. Besides his own great genius, which was in every respect admirably formed for the purpose, he was trained as it were in a city, at that time the empress of the world, and in the politest reign that ever was; having scarcely had any other school than the court of Augustus. He had access to the very best materials, such as the Memoirs of Sylla, Cæsar, Labienus, Pollio, Augustus, and others, written by themselves. "What writers of memorials (says Lord Bolingbroke), what compilers of the Materia Historica, were these! What genius was necessary to finish up the pictures that such masters had sketched! Rome afforded men that were equal to the task. Let the remains, the precious remains, of Sallust, of Livy, and of Tacitus, witness this truth.—— What a school of public and private virtue had been opened to us at the resurrection of learning, if the latter historians of the Roman commonwealth, and the first of the succeeding monarchy, had come down to us entire! The few that are come down, though broken and imperfect, compose the best body of history that we have; nay, the only body of ancient history that deserves to be an object of study. It fails us indeed most at that remarkable and fatal period, where our reasonable curiosity is raised the highest. Livy employed forty-five books to bring his history down to the end of the sixth century, and the breaking out of the third Punic war: but he employed ninety-five to bring it down from thence to the death of Drusus; that is, through the course of 120 or 130 years. Appian, Dion Cassius, and others, nay, even Plutarch included, make us but poor amends for what is lost of Livy." Speaking then of Tully's orations and letters, as the Livius.

Livius. best adventitious helps to supply this loss, he says, that "the age in which Livy flourished, abounded with such materials as these: they were fresh, they were authentic: it was easy to procure them; it was safe to employ them. How he did employ them in executing the second part of his design, we may judge from his execution of the first; and, I own, I should be glad to exchange, if it were possible, what we have of this history for what we have not. Would you not be glad my Lord, to see, in one stupendous draught, the whole progress of that government from liberty to servitude; the whole series of causes and effects, apparent and real, public and private?" &c.

The encomiums bestowed upon Livy, by both ancients and moderns, are great and numerous. He not only entertains like Herodotus; he also instructs and interests in the deepest manner. But his great probity, candour, and impartiality, are what have distinguished Livy above all historians; for neither complaisance to the times, nor his particular connexions with the emperor, could restrain him from speaking well of Pompey; so well, as to make Augustus call him a *Pompeian*. This we learn from Cremutius Cordus, in Tacitus; who relates also, much to the emperor's honour, that this gave no interruption to their friendship. But whatever elogies Livy may have received as an historian, he has not escaped censure as a writer. In the age wherein he lived, Asinius Pollio charged him with Patavinity; which Patavinity has been variously explained by various writers, but is generally supposed to relate to his style. The most common is, that this noble Roman, accustomed to the delicacy of the language spoken in the court of Augustus, could not bear with certain provincial idioms, which Livy, as a Paduan, used in divers places of his history. Pignorius is of another opinion, and believes that this Patavinity regarded the orthography of certain words, wherein Livy used one letter for another, according to the custom of his country, writing *sibe* and *quase* for *sibi* and *quasi*; which he attempts to prove by several ancient inscriptions. The expressions, however, or the orthography of words, are not loaded with obscurity, and the perfect classic is as familiarly acquainted with those supposed provincialisms as with the purest Latinity.—Livy has been censured too, and perhaps with justice, for being too credulous, and burdening his history with vulgar notions and superstitious tales. He may disgust when he mentions that milk and blood were rained from heaven, or that an ox spoke or a woman changed her sex; yet he candidly confesses that he recorded only what made an indelible impression upon the minds of a credulous age.

Is it worth while to mention here the capricious and tyrannic humour of the emperor Caligula, who accused Livy of being a negligent and wordy writer, and resolved therefore to remove his works and statues out of all libraries where he knew they were curiously preserved? Or the same humour in Domitian, another prodigy of nature, who put to death Metius Pomposianus, because he made a collection of some orations of kings and generals out of Livy's history? Pope Gregory the Great, also, would not suffer Livy in any Christian library, because of the Pagan superstition wherewith he abounded: but the same reason held good against all ancient authors; and indeed Gregory's zeal was far from being levelled at Livy in particular, the pontiff having declared war against all human learning. Livius, Livonia.

Though we know nothing of Livy's family, yet we learn from Quintilian, that he had a son, to whom he addressed some excellent precepts in rhetoric. An ancient inscription speaks also of one of his daughters, named *Livia Quarta*: the same, perhaps, that espoused the orator Lucius Magius, whom Seneca mentions; and observes, that the applauses he usually received from the public in his harangues, were not so much on his own account, as for the sake of his father-in-law.

Our author's history has been often published with and without the supplement of Freinshemius. The best editions are, that of Gronovius, *cum notis variorum et suis*, Lugd. Bat. 1679, 3 vols. 8vo; that of Le Clerc at Amsterdam, 1709, 10 vols. 12mo; and that of Crevier, at Paris, 1735, 6 vols. 4to. These have the supplements.—Learning perhaps never sustained a greater loss, in any single author, than by the destruction of the latter and more interesting part of Livy. Several eminent moderns have indulged the pleasing expectation that the entire work of this noble historian might yet be recovered. It has been said to exist in an Arabic version: and even a complete copy of the original is supposed to have been extant as late as the year 1631, and to have perished at that time in the plunder of Magdeburg. The munificent patron of learning Leo X. exerted the most generous zeal to rescue from oblivion the valuable treasure, which one of his most bigotted predecessors, above mentioned, had expelled from every Christian library. Bayle has preserved, under the article Leo, two curious original letters of that pontiff, concerning his hopes of recovering Livy; which afford most honourable proofs of his liberality in the cause of letters.—A lately discovered fragment of Livy's history was published in 1773 by Dr Bruns.

Livius *Andronicus*, a comic poet who flourished at Rome about 240 years before the Christian era. He was the first who turned the personal satires and fescennine verses, so long the admiration of the Romans, into the form of a proper dialogue and regular play. Though the character of a player, so valued and applauded in Greece, was reckoned vile and despicable among the Romans, Andronicus acted a part in his dramatical compositions, and engaged the attention of his audience, by repeating what he had laboured after the manner of the Greeks. Andronicus was the freedman of M. Livius Salinator, whose children he educated. His poetry was grown obsolete in the age of Cicero, whose nicety and judgment would not even recommend the reading of it.

LIVONIA, a large province of the Russian empire, with the title of a duchy. It is bounded on the north by Esthonia, on the west by the gulf of Riga, on the south by Courland, and on the east, partly by Plescow, and partly by Novogorod. It is about 200 miles from north to south, and 150 from east to west. The land is so fertile in corn, that it is called the *granary of the north*; and would produce a great deal more, if it was not so full of lakes. The fish that abound here are salmons, carps, pikes, flat fish, and many others. In the forests there are wolves, bears, elks, rein-deer, stags, and hares. The domestic animals are very numerous; but the sheep bear very bad wool. Here are a great

Livonia || Loach.

number of forests, which consist of birch trees, pines, and oaks; and all the houses of the inhabitants are built with wood. The merchandises which they send abroad are flax, hemp, honey, wax, leather skins, and potashes. The Swedes were formerly possessed of this province, but were obliged to abandon it to the Russians after the battle of Pultowa; and it was ceded to them by the peace of the north, concluded in 1722, which was confirmed by another treaty in 1742. It formerly included Estonia, with the two islands called *Oesel* and *Dagho*. Riga is the capital.

LIVONICA-TERRA, a kind of fine bole used in the shops of Germany and Italy. It is found in Livonia, from whence it takes its name. It is in the form of little cakes.

LIVRE, a French money of account, containing 20 sols. See *Money-Table*.

LIXA, or LIXUS, in *Ancient Geography*, a town on the Atlantic near the river Lixus; made a Roman colony by Claudius Cæsar; famous in mythology for the palace of Antæus and his encounter with Hercules, (Pliny). Now *Larache*, 65 leagues to the south of the straits of Gibraltar.

LIXIVIOUS, an appellation given to salts obtained from burnt vegetables by pouring water on their ashes.

LIXIVIUM, in *Pharmacy*, &c. a ley obtained by pouring some liquor upon the ashes of plants; which is more or less powerful, as it has imbibed the fixed salts contained in the ashes.

LIXNAW, a barony in the county of Kerry and province of Munster in Ireland, which gives title of baron to the earls of Kerry; the village here of this name being their ancient seat, where the castle was erected. This seat stands agreeably on the river Brick, which is here cut into several pleasant navigable canals, that adorn its plantations and gardens. W. Long. 9. 15. N. Lat. 52. 15.

LIZARD. See LACERTA, ERPETOLOGY *Index*.

LIZARD, in *Geography*, a cape or promontory of Cornwall, situated, according to the most common computation, in W. Long. 5. 47. N. Lat. 49. 50.

LLANDAFF. See LANDAFF.

LLOYD, WILLIAM, a most learned English writer and bishop, was born in Berkshire in England in 1627. He was educated under his father, rector of Sonning, and vicar of Tyle-hurst in Berkshire; then went to Oxford, and took orders. In 1660 he was made prebendary of Rippon; and in 1666 chaplain to the king. In 1667 he took the degree of doctor of divinity; in 1672 he was installed dean of Bangor; and in 1680 was consecrated bishop of St Asaph. He was one of the six bishops who, with Archbishop Sancroft, were committed prisoners to the tower of London, for subscribing a petition to the king against distributing and publishing his declaration for liberty of conscience. Soon after the Revolution he was made almoner to King William and Queen Mary: in 1692 he was translated to the bishopric of Litchfield and Coventry; and in 1699, to the see of Worcester, where he sat till his death, which happened in 1717, the 91st year of his age. Dr Burnet gives him an exalted character, and his works are highly esteemed.

LOACH. See COBITIS, ICHTHYOLOGY *Index*.

LOAD, or LODE, in *Mining*, a word used especially in the tin-mines, for any regular vein or course, whether metallic or not; but most commonly load means a metallic vein. When the substances forming these loads are reducible to metal, the loads are by the English miners said to be alive; otherwise they are termed dead loads.

Load || Loango.

In Cornwall and Devonshire the loads chiefly hold their course from eastward to westward, though in other parts of England they frequently run from north to south. See VEINS, GEOLOGY *Index*.

LOAD is also used for nine dishes of ore, each dish being about half a hundred weight.

LOADSTONE. See MAGNET.

LOAMS, in *Natural History*, are defined to be earths composed of dissimilar particles, stiff, dense, hard, and rough to the touch; not easily broke while moist, readily diffusible in water, and composed of sand and a tough viscid clay. Of these loams some are whitish, and others brown and yellow.

LOAN, any thing given to another, on condition of return or payment.

Public Loans. See FUNDS and *NATIONAL Debt*.

LOANDA, a province of the kingdom of Angola in Africa. It is an island about 15 miles in length, and three in breadth; remarkable chiefly for the capital of Angola situated upon it, in E. Long. 12. 25. S. Lat. 8. 45. This town was built by the Portuguese in 1578, under the direction of the first Portuguese governor in these parts. It is large, populous, and pleasantly seated on the declivity of a hill near the sea-coast, and facing the south-west. The island is supplied with fresh water from wells dug in it; and which are not sunk below the depth of three feet when they are filled with excellent water. It is remarkable, however, that the water of these wells continues good only during the time of high tide; for, as that sinks, the water becomes more and more brackish, till at last it is quite salt, almost as much as the sea itself. On the coast of this island are fished the zimbis, or shells used in several parts of Africa instead of money; and with these shells, instead of coin, is carried on a great part of the traffic of this country.

LOANGO, a kingdom of Africa, extending itself about 180 geographical miles in length from south to north; that is, from Cape St Catherine under the second degree of south latitude, to a small river called *Lovando Louisia*, on the 5th degree of the same. From west to east it extends from Cape Negro on the coast towards the *Buchumalean* mountains, so called on account of the vast quantity of ivory and great droves of elephants, about 300 miles. It is divided into four principal provinces, viz. those of Lovangiri, Loangomongo, Chilongo, and Piri.

The inhabitants are very black, well shaped, and of a mild temper. The men wear long petticoats, from the waist downwards, and have a piece of cloth round their waist. The women's petticoats are made of straw.

This country abounds with poultry, oxen, cows, sheep, goats, elephants, tigers, leopards, civet-cats, and other animals; so that here are great quantities of elephants teeth, and fine furs, to be traded for.

The capital city, where the king resides, called *Loango*, and in the language of the negroes, *Boarie*, is situated in South Lat. 4½ degrees, a league and a half from

Loango || Local.

from the sea-coast, and is shaded and adorned with bananas, and other trees. The king, who resides in a large palace in the middle of it, has about 1500 concubines. If any of them is surprised in adultery, she and her paramour are instantly conveyed to the top of a very high hill, whence they are hurled down headlong from the steepest place.

Every man marries as many wives here as he pleases, who are obliged to get their husbands a livelihood, as is the practice all along the African coast inhabited by blacks. The women, therefore, cultivate the land, sow and reap, while the lazy husbands loiter away their time in idleness.

The king's revenue consists in elephants teeth, copper, and a kind of petticoats made of palm-tree leaves, and called *lavogus*: he has whole store-houses full of these lavogus; but his greatest riches consist in slaves of both sexes.

LOBBY, in *Architecture*, is a small hall or waiting-room: it is also an entrance into a principal apartment, where there is a considerable space between that and a portico or vestibule, and the length or dimensions will not allow it to be considered as a vestibule or an anti-room. See ANTICHAMBER.

LOBE, in *Anatomy*, any fleshy protuberant part, as the lobes of the lungs, the lobes of the ears, &c.

LOBELIA, CARDINAL-FLOWER; a genus of plants belonging to the syngenesia class; and in the natural method ranking under the 29th order, *Campanaceæ*. See BOTANY *Index*.

LOBETUM, anciently a town of the Hither Spain: said to have been built by the Libyan Hercules, (Pliny). Now *Albarazin*, a town of Arragon on the confines of New Castile, on the river Guadalavir. E. Long. 2. N. Lat. 40. 40.

LOBO, JEROME, a Jesuit missionary, was born at Lisbon in the year 1593. He became a member of the Jesuit society at 16 years of age, and in 1622 went out as a missionary to the East Indies. He sailed to the coast of Mozambique, after making some stay at Goa; and afterwards penetrated into Abyssinia, where his zeal and resolution brought on him the hatred of the monks, from which he incurred much danger and suffering. As he returned to Portugal he was shipwrecked on the coast of Natal, where seven months were spent in constructing shallops to bring them away. One of them foundered, but that in which Father Lobo sailed arrived safe at Angola. After a variety of adventures he arrived at Lisbon; and he employed himself in the cause of the Ethiopian mission both at Madrid and Rome. He took a second voyage to the Indies, where he was made rector of the house at Goa. He returned to Lisbon in 1658, and was chosen rector of the college of Coimbra, where he died in 1678, at the age of 84.

Lobo wrote an historical account of Abyssinia in the Portuguese language, which contains information both curious and valuable. It was translated into French by the abbé le Grand in 4to, in 1728; and the earliest production of Dr Samuel Johnson was an abridged version of this work.

LOBSTER, a species of cancer. See CANCER, ENTOMOLOGY *Index*.

LOCAL, in *Law*, something fixed to the freehold, or tied to a certain place; thus, real actions are local, since they must be brought in the country where they lie; and local customs are those peculiar to certain countries and places.

Local || Loch.

LOCAL Medicines, those destined to act upon particular parts; as fomentations, epithems, vesicatories, &c.

LOCARNO, a town of Switzerland, capital of a bailiwick of the same name, seated at the north end of the lake Maggiore, near the river Magia. It carries on a great trade; and the country abounds in pastures, wine, and fruits. It contains 1500 inhabitants. E. Long. 8. 41. N. Lat. 46. 6.

LOCHABER, a district of the shire of Inverness in Scotland. It is bounded by Moydart on the west, Glengary on the north, Badenoch on the east, and Lorn on the south. It derives its name from the lake or loch Aber; and extends about 20 miles from east to west, and 30 from north to south. The country is barren, bleak, mountainous, and rugged. Near the mouth of the river Aber, in the centre between the West and North Highlands, stands Fort William, with the town of Maryburgh, built upon a navigable arm of the sea, not far from the foot of *Benevis*. The town, designed as a sutlery for the garrison, was erected into a borough; and the fort itself was designed as a check upon some of the clans, who had been guilty of depredations and other irregularities. Lochaber is inhabited mostly by the Macdonalds, Camerons, and Mackintoshes. The castle of Macdonald of Glengary, in this district, was burnt to the ground in the year 1715, in consequence of his declaring for the Pretender. The elegant house and gardens belonging to Cameron of Lochiel underwent the same fate, for the same reason, in the year 1746.

LOCHIA, in *Midwifery*, a flux from the uterus consequent to delivery. See MIDWIFERY.

LOCK, a well-known instrument used for fastening doors, chests, &c. generally opened by a key.

The lock is reckoned the masterpiece in smithery; a great deal of art and delicacy being required in contriving and varying the wards, springs, bolts, &c. and adjusting them to the places where they are to be used, and to the various occasions of using them.

From the various structure of locks, accommodated to their different intentions, they acquire various names. Those placed on outer doors are called *stock-locks*; those on chamber doors, *spring-locks*; those on trunks, *trunk-locks*, *pad-locks*, &c.

Of these the spring-lock is the most considerable, both for its frequency and the curiosity of its structure. Its principal parts are, the main-plate, the cover-plate, and the pin-hole: to the main-plate belong the key-hole, top-hook, cross-wards, bolt-toe or bolt-knab, drawback-spring tumbler, pin of the tumbler, and the staples; to the cover-plate belong the pin, main-ward, cross-ward, step-ward or dap-ward; to the pin-hole belong the hook-ward, main cross-ward, shank, the pot or bread, bow-ward, and bit.

As on the proper construction of locks the security of the most valuable kinds of property almost entirely depends, and as numberless devices are continually fallen upon to elude the utmost efforts of mechanical invention in this respect, it thence becomes an object of no small importance to invent a lock which it should be *impossible* to open except by its proper key. A treatise upon this subject has been published by Mr Joseph

Lock. seph Bramah; who is confident that he has brought the matter to the requisite perfection, and that every one may rest assured of the security of his property when under the protection of a lock of his invention. He begins with observing, that the principle on which all locks depend, is the application of a lever to an interior bolt, by means of a communication from without; so that, by means of the latter, the lever acts upon the bolt, and moves it in such a manner as to secure the lid or door from being opened by any pull or push from without. The security of locks in general therefore depends on the number of impediments we can interpose betwixt the lever (the key) and the bolt which secures the door; and these impediments are well known by the name of *wards*, the number and intricacy of which alone are supposed to distinguish a good lock from a bad one. If these wards, however, do not in an effectual manner preclude the access of *all* other instruments besides the proper key, it is still possible for a mechanic of equal skill with the lock-maker to open it without the key, and thus to elude the labour of the other.

"Locks (says our author) have been constructed, and are at present much used and held in great esteem, from which the picklock is excluded: but the admission of false keys is an imperfection for which no locksmith has ever found a corrective; nor can this imperfection be remedied whilst the protection of the bolt is wholly confided to *fixed wards*." This position is proved by a remark, that the wards, let them be as intricate as we please, must all be expressed on what is called the *bit* or *web* of the key: and therefore when all the varieties that can be expressed on this bit or web have been run through, every succeeding lock must be the counterpart of some other; and consequently the same key which opens one will open the other also. This is evident from the locks usually put upon drawers; and which, though they should be made to resist the picklock, are still liable to be opened by ten thousand other keys besides that appropriated to each of them. But though the variety of wards could be augmented even to infinity, still there could be no security against false keys; for as every one of the wards must be expressed on the web of the key, if another key with a web quite plain be made to fit the key-hole exactly, we have only to cover it over with some colouring substance upon which the wards may make an impression; after which, it is easy to cut out the web in a proper manner for admitting them, when the lock will be as easily opened by the false as by the true key.

The first person, according to our author, who had any claim to merit in the branch of lock-making, is Mr Baron; whose lock he acknowledges to be by far more perfect and secure than any that ever appeared before: though he still considers it as unfit for giving that absolute security which is to be wished for. His improvement consisted in the proper application of what are called *tumblers*. "These (says Mr Bramah) are a kind of grapple; by which the bolt is confined, as well in its active as in its passive station, and rendered immoveable till set at liberty by the key. One of these instruments is commonly introduced into all locks that are of any use or value: it is lodged behind the bolt, and is governed by a spring which acts upon the tumbler as the tumbler acts upon the bolt: The application therefore of any force to the tumbler, which is superior to the force of the spring, will cause it to quit its hold, and set the bolt at liberty." In the common method of applying these machines, however, it matters nothing how far the tumbler is lifted above the point at which it ceases to controul the bolt; but it is otherwise in those of Mr Baron's construction. The action of his tumblers is circumscribed by a certain space cut in the centre of the bolt, of dimensions sufficient only to answer the purpose intended. The space in which the tumbler moves is an oblong square; and is not only furnished with niches on the under side, into which the hooks of the tumblers are forced by the spring as in other locks, but is provided with correspondent niches on the other side, into which the hooks are driven, if any greater force be applied to the tumblers than what is just sufficient to disengage them from the bolt. Hence it becomes absolutely necessary, in the making of a false key, to construct it in such a manner, that it may with the greatest exactness give the requisite degree of pressure and no more. Lock.

Mr Bramah allows that this is a very great improvement, but objects that it is still possible to frame a key which will open it as well as its own; nor will the addition of any number of tumblers preclude the possibility of opening it. "By giving (says he) an uniform motion to the tumblers, and presenting them with a face which exactly tallies with the key, they still partake, in a very great degree, of the nature of *fixed wards;* and the security of this lock is thereby rendered in a proportionable degree defective. Thus, suppose the false key to have passed the wards, and to be in contact with the most prominent of the tumblers, the impression, which the slightest touch will leave on the key, will direct the application of the file till sufficient space is prepared to give it a free passage. The key will then bear upon a more remote tumbler; which difficulty being in like manner got over, the lock will be as easily opened by the false as by the true key."

This seemingly insuperable objection to the perfection of lock-making, however, our author removes with the greatest ease imaginable, by causing the tumblers which project unequally to present a *plane* surface: whence they would require a separate and unequal motion to disengage them; of consequence no distinct impression could be made by them upon the plane surface of the web that would give any idea of their positions with regard to one another, and the construction of a false key would be altogether impossible.

But though the principal difficulty with regard to Mr Baron's lock be now overcome, others still occur, viz. the difficulty of making locks which are constructed with tumblers sufficiently durable. The tumblers themselves, he observes, must be but slightly made; and being exposed to perpetual friction by the key and their own proper motion, they must soon decay; and the keys of Mr Baron's locks, he also observes, are much less durable than those of any other locks he ever saw.

With regard to the lock which Mr Bramah presents to the public as absolutely perfect, he informs us, that the idea of constructing it was first suggested by the alarming increase of house robberies, which may reasonably be supposed to be perpetrated in a great

Lock. measure by perfidious servants, or accomplished by their connivance. Thus it is evident, that the locks which might exclude ordinary housebreakers could be no security against faithless servants, who having constant access to the locks, might easily get false keys fabricated at their leisure. In considering the subject, our author was convinced, that his hope of success depended entirely upon his using means as dissimilar as possible to those by which the old locks were constructed; as these, however varied, had been found insufficient for the purpose. "As nothing (says he) can be more opposite in principle to *fixed wards* than a lock which derives its properties from the *motion* of all its parts, I determined that the construction of such a lock should be the subject of my experiment." In the prosecution of this experiment he had the satisfaction to find, that the least perfect of all his models fully ascertained the truth and certainty of his principle. The exclusion of wards made it necessary to cut off all communication between the key and the bolt; as the same passage, which (in a lock *simply* constructed) would admit the key, might give admission likewise to other instruments. The office, therefore, which in other locks is performed by the extreme point of the key, is here assigned to a lever, which cannot approach the bolt till every part of the lock has undergone a change of position. The necessity of this change to the purposes of the lock, and the absolute impossibility of effecting it otherwise than with the proper key, are the points to be ascertained; and this our author does in the following manner.

Plate CCXCVI. Fig. 1. shows Mr Bramah's first attempt to construct a lock upon this principle: which, to his surprise, turned out complete and perfect. A represents a common axis on which the six levers, crossing the face of the lock, are united as on a joint. Each of these rests upon a separate spring sufficiently strong to bear its weight; or, if depressed by a superior force, to restore it to its proper position when that force is removed. B represents a frame through which the levers pass by separate grooves, exactly fitted to their width, but of sufficient depth to allow them a free motion in a perpendicular direction. The part which projects from the opposite side of the joint A, and is inserted in the bolt C, is a lever to which two offices are assigned; one to keep the bolt in a fixed position, in the absence of the key; the other, to give it its proper motion upon the application of the key. D is a circular platform turning upon a centre. On this the joint or carriage of the levers, and the springs on which they rest, are fixed; and the motion of the platform impels the bolt, in either direction, by means of the lever which is projected from the joint A. The inviolable restraint upon this lock, by which means it is subjected only to the action of the key, is lodged in the part E, which is a thin plate, bearing at each extremity on a block, and having of course a vacant space beneath, equal in height to the thickness of the blocks on which it rests. By this plate the motion of the machine is checked or guided in the following manner: On the edge of the plate which faces the movement there are six notches which receive the ends of the levers projecting beyond the frame B; and while they are confined in this manner the motion of the machine is so totally suspended as to defy every power of art to overcome. Lock.

To understand in what manner the proper key of this lock overcomes these obstacles, it must be observed, that each lever has a notch on its extremity, and that those notches are disposed as irregularly as possible. To give the machine a capacity of motion, these notches must be brought parallel to each other, and by a distinct but unequal pressure upon the levers, be formed into a groove in a direct line with the edge of the plate E, which the notches are exactly fitted to receive. The least motion of the machine, while the levers are in this position, will introduce the edge of the plate into the groove; which, controuling the power of the springs, will give liberty to the levers to move in a horizontal direction as far as the space between the blocks which support the plate E will admit, and which is sufficient to give the machine a power of acting on the bolt. The impossibility of thus bringing the notches on the points of the levers into a direct line, so as to tally with the edge of the plate E by any other means than the motion and impulse of the key, is that which constitutes the principal excellency of this lock.

The key (fig. 2.) exhibits six different surfaces, against which the levers are progressively admitted in the operation of opening the lock: the irregularity of these surfaces shows the unequal and distinct degree of pressure which each lever requires to bring them to their proper bearings, in order to put the machine in motion. Hence it appears, that unless the various heights of the surfaces expressed on the bit of the key are exactly proportioned to the several distances necessary to bring the notches into a straight line with each other, they must remain immoveable; "and (says our author) as one stroke of a file is sufficient to cause such a disproportion as will prove an insurmountable impediment to their motion, I may safely assert, that it is not in art to produce a key or other instrument, by which a lock, constructed upon this principle, can be opened."

On this principle it would even be a matter of great difficulty for any workman, however skilful, to construct a key for the lock when open to his inspection: "for the levers being raised, by the subjacent springs, to an equal height in the frame B, present a *plane* surface; and consequently convey no direction that can be of any use in forming a tally to the *irregular* surface which they present when acting in subjection to the key. Unless therefore we can contrive a method to bring the notches on the points of the levers in a direct line with each other, and to retain them in that position till an exact impression of the irregular surface, which the levers will then exhibit, can be taken; the workman will be unable to fit a key to the lock, or to move the bolt. This process must be rendered extremely troublesome by means of the springs; and if such difficulties occur, even when the lock is open to the inspection of a skilful workman, much more must we suppose it out of the power of one who has not access to the internal parts to make a false key to a lock of this kind.

These difficulties render it necessary in making locks of this kind not to fit the key to the lock, as is usual

in

Lock. in other locks, but to fit the lock to the key. In this kind of lock, therefore, the key must be made first; and the inequalities upon the surface of the bit worked as chance or fancy may direct, without any reference to the lock. The key being thus completed, and applied to the surface of the levers, will, by a gentle pressure, force them to unequal distances from their common station in the frame B, and sink their points to unequal depths into the space beneath the plate E. While the levers are in this position, the edge of the plate E will mark the precise point at which the notch on each lever must be expressed. The notches being cut by this direction, the irregularity which appears when the levers resume their station in the frame B, and the inequality of the recesses on the bit of the key, will appear as a seal and its corresponding impression.

The following is a lock contrived upon the same principle, but more curious; and, in our author's opinion, more extensively useful. Fig. 3. represents a circular block of metal divided from the centre into eight compartments, each containing a cell which forms a passage through the block, as is represented by the small circles described on the flat surface A. In each of these cells two grooves are cut at opposite points, which open a communication with the centre at one point, and with the spherical surface of the block or barrel at the other. The small circle, which marks the centre of the flat surface A, is the key-hole, which likewise forms a passage through the barrel in a parallel line with the cells which surround it. This figure represents the frame in which the active parts of the lock are deposited.

Fig. 4. shows a spiral spring lodged in the bottom of each cell, and occupying one half of the space, the other being filled with a slider resting upon the spring, and represented by fig. 5. the office of these sliders exactly corresponding with that of the levers in the lock already described. Thus, when lodged in their respective cells, they are sustained, like the levers, by the elasticity of the springs upon which they rest, till a superior power be applied; and they are again restored to their stations by the reaction of the springs when the weight is removed. The side B of each slider is projected beyond the circular surface, as represented fig. 6. in a manner similar to the projection of the levers in the former lock beyond the curved frame in which they move. The point C is projected through the interior groove into the space which forms the centre or key-hole, expressed on the flat surface A.

Fig. 7. represents the key. When this is applied, it must of course encounter these interior projections; and when pressed forward, the indented space on its point being unequal, will force the sliders to unequal distances from their bearers; bringing the notches expressed on their exterior projections in a direct line with each other, in a manner similar to that by which the effect is produced upon the levers in the former lock. When the key is withdrawn, and the sliders resume their stations by the pressure of the springs, the disposition of the notches must be irregular in the same proportion that the indentations on the point of the key are unequal; and they must necessarily fall again into a straight line when acted upon by the key.

Fig. 6. shows the barrel completely fitted for action. Its interior end is caped with a plate, which unites its compartments, and confines the springs and sliders within the cells to which they belong. From that plate proceeds the point A, which represents the lever by which the bolt is projected or withdrawn, according to the direction in which the machine performs its revolution. Lo

Fig. 8. shows the flat surface of a thin plate, corresponding in its office with the part C of the former lock. The space cut in its centre is exactly fitted to the spherical surface of the barrel; the circle describing its circumference, and the notches cut on its edge coinciding with the projections of the sliders. The barrel, when encircled with this plate at the middle of its spherical surface, has its motion totally suspended till the notches on the projections of the sliders are forced, by the pressure of the key, into a line with each other: a groove being thus formed on the spherical surface of the barrel parallel to, and coinciding with, the edge of the plate, the machine is at liberty to perform a revolution in any direction, but returns to its confined state when the key is withdrawn.

The parts of the movement being thus united, the interior end of the barrel is deposited in a bed represented fig. 9. To this it is fastened at the angles of the plate represented fig. 8. by which the barrel is encircled. The station of the bolt is at A; the lever which acts upon it being projected on the other side. Fig. 10. is a cap or mask which covers the face of the movement, and completes the lock.

On this lock our author observes, that it is excellent for street doors: "For no method of robbery (says he) is more practised, than gaining admittance into houses by those keys, which, as is well known, may be procured at the old iron shops to fit almost any lock in use. Such robberies are generally committed where the servants are allowed to take the key with them when sent on errands, it being impracticable while the key is fixed in the lock. The variations, by which the production of corresponding keys is avoided, have two sources; the one arising from the changes that may be made in the disposition of the levers; the other from the number of points contained on the projected surface of each lever; by which the position of its notch may, in the smallest degree, be varied.

"The variations producable in the dispositions of six figures only, are 720: these, being progressively multiplied by additional figures, will increase by astonishing degrees; and eventually show, that a lock containing twelve levers will admit of 479,001,500 changes; which, with the addition of another lever, will increase to 6,227,020,800. These being again multiplied by the number of changes which the projected surface of the levers will admit in the disposition of the notches, their amount will exceed numeration, and may therefore be properly said to be infinite. The slightest inspection will at once show, that their construction precludes all possibility of obtaining an impression of their internal parts, which is necessary for the fabrication of a false key; for it will be easily seen, that the positions into which the levers are forced by the pressure of the key in opening the lock, can no more be ascertained when the key is withdrawn, than the seal can be copied from its impression on a fluid, or the course of a ship be discovered by tracing it on the surface of the

Lock, Locke.

waves. But inviolable security is not the only excellence they possess; the simplicity of their principle gives them likewise a great advantage over locks that are more complicated, in point of duration; for their essential parts being subject to no friction, nor exposed to any possible accident from without, they will be less affected by use, and less liable to stand in need of repair."

LOCK, or *Weir*, in inland navigations, the general name for all those works of wood or stone made to confine and raise the water of a river: the banks also which are made to divert the course of a river, are called by these names in some places. But the term *lock* is more particularly appropriated to express a kind of canal enclosed between two gates; the upper called by workmen the sluice gate, and the lower called the flood gate. These serve in artificial navigations to confine the water, and render the passage of boats easy in passing up and down the stream. See CANAL.

LOCKE, JOHN, an eminent English philosopher and writer in the latter end of the 17th century, was son of Mr John Locke of Pensford in Somersetshire, and born at Wrington, near Bristol, in 1632. He was sent to Christ-church in Oxford; but was highly dissatisfied with the common course of studies then pursued in the university, where nothing was taught but the Aristotelian philosophy; and had a great aversion to the disputes of the schools then in use. The first books which gave him a relish for philosophy were the writings of Des Cartes: for though he did not always approve of his notions, yet he thought he wrote with great perspicuity. He applied himself with vigour to his studies, particularly to physic, in which he gained a considerable knowledge, though he never practised it. In 1664, he went to Germany as secretary to Sir William Swan, envoy from the English court to the elector of Brandenburg and some other German princes. In less than a year, he returned to England; where, among other studies, he applied himself to that of natural philosophy, as appears from a register of the changes of the air, which he kept at Oxford from June 24. 1666, to March 28. 1667. There he became acquainted with the lord Ashly, afterwards earl of Shaftesbury, who introduced him into the conversation of some of the most eminent persons of that time. In 1670, he began to form the plan of his Essay on Human Understanding; but his employments and avocations prevented him from finishing it then. About this time he became a member of the Royal Society. In 1672, his patron, now earl of Shaftesbury, and lord chancellor of England, appointed him secretary of the presentations, which place he held till the earl resigned the great seal. In 1673, he was made secretary to a commission of trade, worth 500l. a-year; but that commission was dissolved in 1674. The earl of Shaftesbury being restored to favour, and made president of the council in 1679, sent for Mr Locke to London: but that nobleman did not continue long in his post, being sent prisoner to the Tower; and after his discharge retired to Holland in 1682.

Mr Locke followed his patron thither. He had not been absent from England a year, when he was accused at court of having written certain tracts against the government, which were afterward discovered to be written by another person; and in November 1684, he was deprived of his place of student in Christ-church. In 1685, the English envoy at the Hague demanded him and 83 other persons to be delivered up by the states general: upon which he lay concealed till the year following; and during this time formed a weekly assembly with Mr Limborch, Mr Le Clerc, and other learned men at Amsterdam. In 1689 he returned to England in the fleet which conveyed the princess of Orange; and endeavoured to procure his restoration to his place of student of Christ-church, that it might appear from thence that he had been unjustly deprived of it: but when he found the college would admit him only as a supernumerary student, he desisted from his claim.

Locke || Locle.

Being esteemed a sufferer for revolution principles, he might easily have obtained a more profitable post; but he contented himself with that of commissioner of appeals, worth 200l. a-year, which was procured for him by the lord Mordaunt; and about the same time he was offered an appointment in a diplomatic character, but the infirm state of his health prevented him from accepting it. He went afterwards to reside with Sir Francis Masham and his lady, at Oates in Essex, about 25 miles from London, where he spent most of his time during the rest of his life. In this agreeable situation he enjoyed that health and vigour which enabled him to exert his talents in writing on political subjects. Hence he appears in defence of the revolution in one piece; and considering the great national concern at that time, the ill state of the silver coin, and proposing remedies for it, in others. Hence he was made a commissioner of trade and plantations in 1695, which engaged him in the immediate business of the state; and with regard to the church, he published a treatise the same year, to promote the scheme which King William had much at heart, of a comprehension with the dissenters. This, however, drew him into one controversy; which was scarcely ended, when he entered into another in defence of his essay, which he held till 1698; soon after which the asthma, his constitutional disorder, increasing with his years, began to subdue him; and he became so infirm, that in 1700 he resigned his seat at the board of trade, because he could no longer bear the air of London sufficient for a regular attendance upon it. After this resignation he continued altogether at Oates; in which retirement he employed the remaining last years of his life entirely in the study of the Holy Scriptures.

He died in 1704, aged 73. His writings will immortalize his name. The earl of Shaftesbury, author of the Characteristics, though in one place he speaks of Mr Locke's philosophy with severity; yet observes, concerning his Essay on the Human Understanding, in general, "that it may qualify men as well for business and the world, as for the sciences and the university." His Discourses on Government, Letters on Toleration, and Commentaries on some of St Paul's Epistles, are also held in much esteem.

LOCKED JAW. See MEDICINE *Index*.

LOCKMAN, an officer in the isle of Man, who executes the orders of government, much like our under sheriff.

LOCKMAN, an eastern philosopher. See LOKMAN.

LOCLE, a town in a district of the same name in

LOCK. PLATE CCXCVI.

Fig. 1.

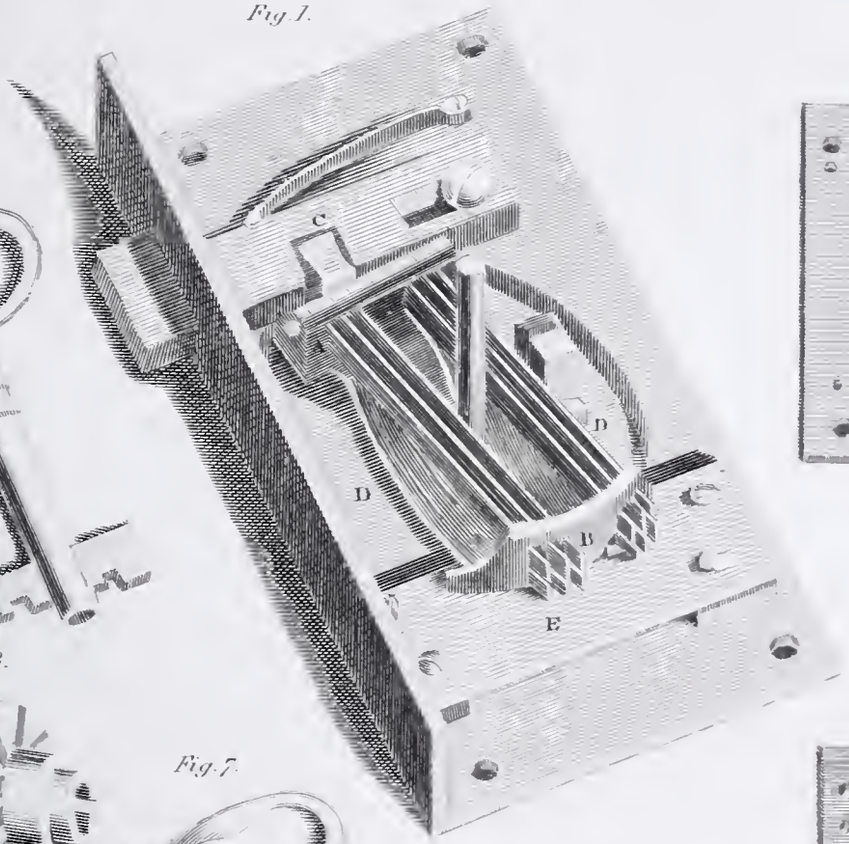


Fig. 2.

Fig. 3.

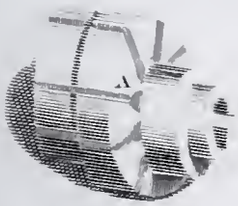


Fig. 4.

Fig. 5.

Fig. 7.

Fig. 6.

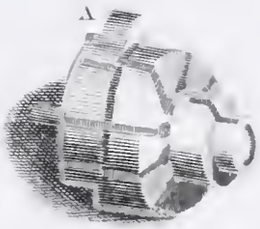


Fig. 8.

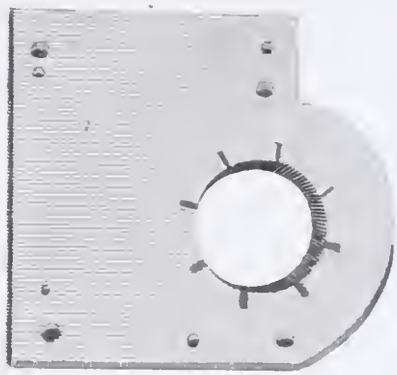


Fig. 10.

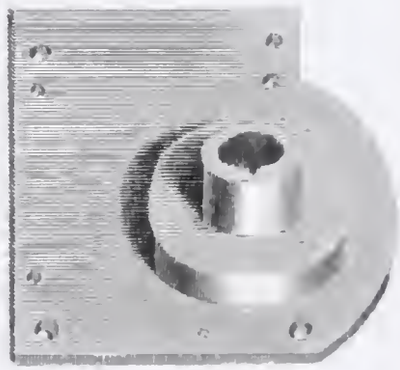
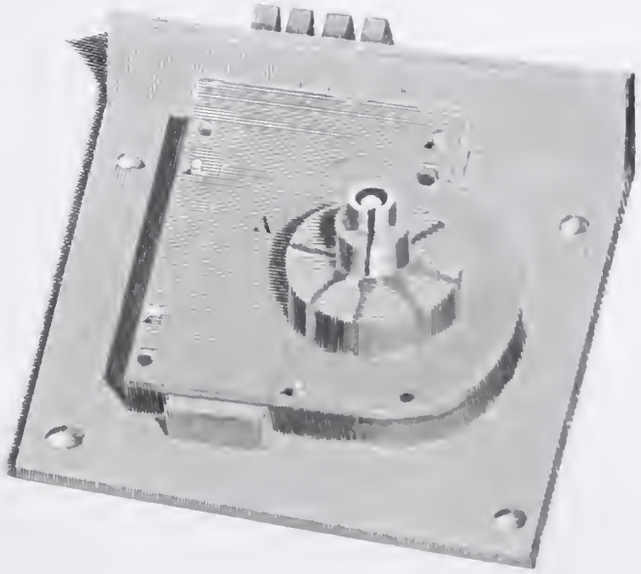


Fig. 9.



Locle ‖ Log.

in Switzerland, adjacent to Neufchatel and Vallengin, and united with another named *La Ghaux de Fond*. But these districts occupy some valleys formed by the mountains of Jura; the greatest part of which not many years ago was one continued forest, though now converted into fine pasture ground filled with flourishing villages. The inhabitants are remarkable for their industry, and excel in many mechanical arts, particularly in watch and clock making; 40,000 watches, it is said, are made in a year. The most singular object at this place, is three subterranean mills, erected on the river Bied, vertically above one another, and 100 feet below the surface of the ground.

LOCRI, or *Locri Epizephyrii*, in *Ancient Geography*, a town on the Ionian sea near the promontory Zephyrium. The people are said to be the first who used a code of written laws, compiled by Zaleucus from the laws of the Cretans and others.

LOCRIS, a country of Achaia in Greece; twofold, and divided by Mount Parnassus. The Hither was occupied by the Locri Ozolæ, called also *Zephyrii*, or Western, contained between Ætolia and Phocis. The Farther Locris lay beyond Parnassus, running out towards Thermopylæ, and reaching to the Euripus of Eubœa; occupied by the Locri Opuntii, and Epicnemidii, who were called the Eastern Locri.

LOCUS GEOMETRICUS, denotes a line by which a local or indeterminate problem is solved.

A *locus* is a line, any point of which may equally solve an indeterminate problem. Thus if a right line suffice for the construction of the equation, it is called *locus ad rectum;* if a circle, *locus ad circulum;* if a parabola, *locus ad parabolam;* if an ellipsis, *locus ad ellipsin:* and so of the rest of the conic sections.

LOCULAMENTA, and LOCULI, in *Botany*, cells or pockets: The internal divisions of a capsule, or other dry seed-vessel, enclosing the seeds.

LOCUST. See GRYLLUS, ENTOMOLOGY *Index*.

Locust-Eaters. See ACRIDOPHAGI.

American Locust, or *Frog-hopper*. See CICADA, ENTOMOLOGY *Index*.

Locust-Tree. See HYMENÆA and GLEDITSIA, BOTANY *Index*.

LOCUTIUS, in *Mythology*, the god of speech among the Romans, called by Livy *Anis Locutius*.

LUCUTORIUM. A hall or apartment in monasteries, where the monks and other religious met after dinner to converse together.

LODI, a walled town of Austrian Lombardy, situated on the Adda, in 45. 20. N. Lat. and 9. 30. E. Long. It has a cathedral, 9 churches, and 26 convents, and about 12,000 inhabitants. Here Bonaparte defeated the Austrians in 1796.

LODGMENT, in military affairs, a work made by the besiegers in some part of a fortification (after the besieged have been driven out), to maintain it, and be covered from the enemy's fire.

LOG, in the Jewish antiquities, a measure which held a quarter of a cab, and consequently five-sixths of a pint. There is mention of a log, 2 Kings vi. 25. under the name of a *fourth part of a cab*. But in Leviticus the word log is often met with, and signifies the measure of oil which lepers were to offer at the temple after they were cured of their disease. Dr Arbuthnot says, that the log was a measure of liquids, the seventy-second part of the bath or ephah, and twelfth part of the hin, according to all the accounts of the Jewish writers.

Log

LOG, a sea term, signifying a small piece of timber *a*, (fig. 3.) of a triangular, sectoral, or quadrantal figure, on board a ship, generally about a quarter of an inch thick, and five or six inches from the angular point to the circumference. It is balanced by a thin plate of lead, nailed to the arch, or circular side, so as to swim perpendicularly in the water. Plate CCXVII. fig. 3.

Log-Line, a little cord, or line, about a hundred and fifty fathoms long, fastened to the log by means of two legs *a b* (fig. 4.), one of which passes through a hole at the corner, and is knotted on the opposite side, while the other leg is attached to the arch by a pin fixed into another hole, so as to draw out occasionally. By these legs the log is hung in equilibrio; and the line thus annexed to it is wound round a reel (fig. 2.), fixed for that purpose in the gallery of the ship. Fig. 4. Fig. 2.

This line, from the distance of about ten, twelve, or fifteen fathoms off the log, has certain knots or divisions, which ought to be at least fifty feet from each other; though it was the common practice at sea not to have them above forty-two feet asunder.

The length of each knot ought to be the same part of a sea mile as half a minute is of an hour; and admitting the measurement of Mr Norwood, who makes a degree on a great circle of the earth to contain 367,200 English feet, or about 69½ English statute miles; and therefore $\frac{1}{60}$th part of it, or a nautical mile, will be 6120 feet; $\frac{1}{120}$th of 6120, or 51 feet, should be the length of each knot. But because it is safer to have the reckoning rather before the ship than after it, therefore fifty feet may be taken as the proper length of each knot. The knots are sometimes made to consist only of forty-two feet each, even in the present practice; and this method of dividing the log-line was founded on the supposition that 60 miles, each of 5000 English feet, made a degree; for $\frac{1}{120}$ of 5000 is 41$\frac{2}{3}$, or, in round numbers, 42 feet. Mariners rather than quit the old way, though known to be erroneous, use glasses for half minute ones, that run but 24 or 25 seconds. They have also used a line of 45 feet or 30 seconds, or a glass of 28 seconds to 42 feet. When this is the case, the distance between the knots should be corrected by the following proportion: as 30 is to 50; so is the number of seconds of the glass to the distance between the knots upon the line. The heat or moisture of the weather has often a considerable effect upon the glass, so as to make it run slower or faster; it should, therefore, be frequently tried by the pendulum in the following manner. On a round nail hang a string that has a musket ball fixed to one end, carefully measuring between the centre of the ball and the string's loop over the peg 39$\frac{1}{8}$ inches, being the length of a second pendulum; then swing it, and count one for every time it passes under the peg, beginning at the second time it passes, and the number of swings made during the time the glass is running out shows the seconds it contains. The line also is liable to relax and shrink, and should therefore be occasionally measured.

The use of the log and line is to keep account and make an estimate of the ship's way or distance run which is done by observing the length of line unwound in half a minute's time, told by a half-minute glass for so many knots as run out in that time, so many

Log. miles the ship sails in an hour. Thus, if there be four knots veered out in half a minute, the ship is computed to run four miles an hour.

The author of this device for measuring the ship's way is not known; and no mention of it occurs till the year 1607, in an East India voyage published by Purchas; but from that time its name occurs in other voyages among his collections; and henceforward it was taken notice of both by our own authors and by foreigners; as by Gunter in 1623; Snellius in 1624; and almost by all the succeeding writers on navigation.

To Heave the Log, as they call it, they throw it into the water on the lee-side, letting it run till it comes without the eddy of the ship's wake; then one holding a half minute glass, turns it up just as the first knot, or the mark from which the knots begin to be reckoned, turns off the reel (fig. 2.) or passes over the stern. As soon as the glass is out, the reel is stopped, and the knots run off are told, and their parts estimated.

Fig. 2.

It is usual to heave the log once every hour in ships of war and East Indiamen, and in all other vessels once in two hours, allowance being made for the wind having increased or abated in the intervals.

The log is a very precarious way of computing, and must always be corrected by experience, there being much uncertainty from the motions of the ship, the winds of variable force, the friction of the reel and lightness of the log in the course of the current. Yet this is a much more exact way of computing than any other in use; much preferable certainly to that of the Spaniards and Portuguese, who guessed at the ship's way by the running of the froth or water by the ship's side; or to that of the Dutch, who used to heave a chip overboard, and to number the paces they walk on the deck while the chip swims between any two marks or bulk heads on the side.

Compound Log. The above-mentioned errors, and particularly the log's being subject to drive with the motion of the water at its surface, whereas the experiment requires it to be fixed in the place where it is when the mark commencing the knots goes off the reel, have been considered, and many methods proposed to remove or to lessen them. M. Bouguer proposed the following method. Take for the log a conical piece of wood, which fix to the log-line passed through or along its axis, at about 40, 50, or 60, or more feet, from one end; and to this end fix the diver, which is a body formed of two equal square pieces of tin, or of thin iron plate, fixed at right angles to one another along their diagonals; and its size so fitted to that of the cone, that the whole may float. A cone of three inches diameter in the base, and of six inches in the slant height, is proposed by M. Bouguer to suit a diver made of plates about $9\frac{1}{4}$ inches square; the intersection of the diagonals is joined to the log-line, and the loop and peg fixed as in the common log. However, it has been found, that no kind of wood used in British dockyards, when formed into a cone of the above dimensions, will float a diver made of stout tin-plates, one side of the square being $9\frac{1}{4}$ inches. Such a diver weighing $1\frac{7}{8}$lb. avoirdupois, required to float it a cone of five inches diameter and twelve inches on the slant side, so as the point of the cone, which was made of light fir, should just appear above the water. Now, supposing one side of such a square tin diver to be about ten inches, and made of plates only two-thirds of the thickness of the former, such a diver would weigh, with its solder, about 20 ounces, and can be floated by a light fir cone of four inches diameter in the base, and ten inches in the slant height or length; and such a compound log might perhaps be found on trial to be affected by about as much again as that proposed by M. Bouguer; and consequently the difference between the numbers given by the common log and compound log, must be augmented by two-thirds of itself for the necessary correction as below. When the compound log of Bouguer, above described, is hove overboard, the diver will sink too deep to be much affected by the current or motion of water at the surface, and the log will thereby keep more steadily in the place where it first fell; and consequently the knots run off the reel will show more accurately the ship's rate of sailing. As the common log is affected by the whole motion of the current, so this compound log will feel only a part thereof, viz. such a part nearly as the resistance of the cone is to the resistance of the diver; then the resistances of the above cone and diver are about as 1 to 5; and consequently this log will drive but one-fifth part of what the common log would do; and so the ship's true run will be affected by one-fifth only of the motion of the waters. To obtain the true rate of sailing, it will be proper to heave alternately, hour and hour, the common log, and this compound log; then the difference of their knots run off, augmented by its one-fourth part, is the correction; which applied to the knots of the common log, will give the ship's true rate of sailing at the middle time between the hours when these logs were hove. The correction is additive when the compound log's run is the greatest, otherwise it is subtractive. To find the course made good: increase the observed angle between the log lines by one-fourth part; and this gives the correction to be applied to the apparent course, or the opposite of that shown by the common log; the correction is to be applied to the $\left\{\begin{matrix}\text{right}\\\text{left}\end{matrix}\right\}$ of the apparent course, when the bearing of the common log is to the $\left\{\begin{matrix}\text{left}\\\text{right}\end{matrix}\right\}$ of the compound log. Or, thus: the lengths run off both logs, together with their bearings, being known; in a card or compass apply the knots run off, taken from a scale of equal parts along their respective bearings from the centre; join the ends; and in this line produced, on the side next the compound log's length, take one-fourth of the interval; then a line drawn from the end, thus produced, to the centre of the card, will show the true course and distance made good. When a current, such as a tide, runs to any depth, the velocity of that current may be much better ascertained by the compound log than by the common one, provided the diver does not descend lower than the run of the current; for as those ships which are deepest immerged, drive fastest with the tide; so the diver, by being acted on below, as well as the log on the surface, their joint motion will give the total effect of the current's motion better than what could be derived from the motion at the surface only. Also, by such a compound log, the depth to which any current runs may be easily tried.

Mem. Acad. Scien. 1747.

Other Logs. We have an account in the voyage to the North

LOG.

PLATE CCXCVII.

Fig. 1.

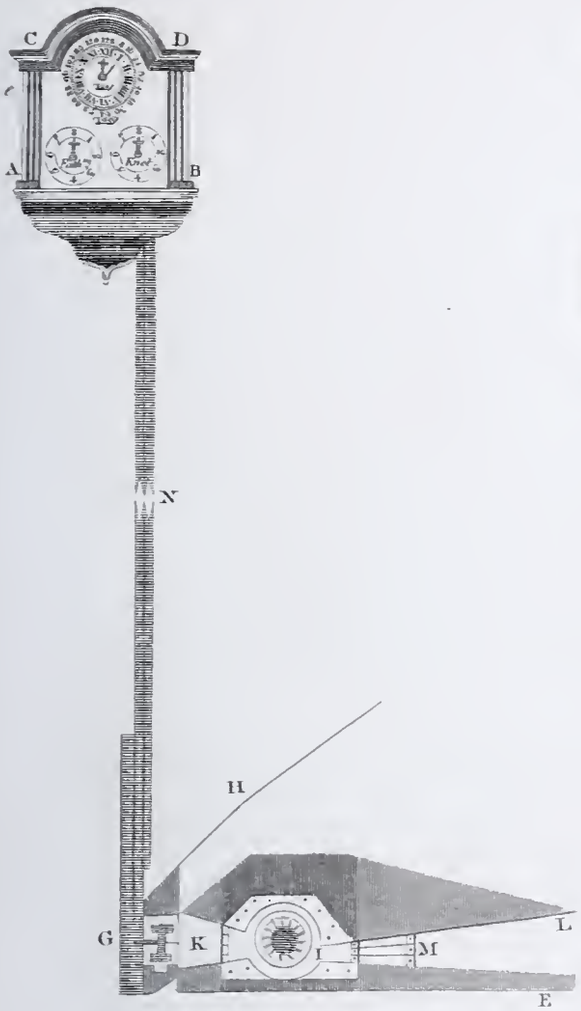


Fig. 2

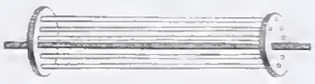


Fig. 3

Fig. 4.

LOGARITHMS.

Fig. 1

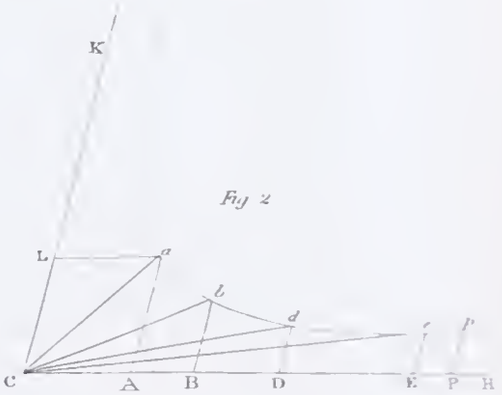


Fig. 3

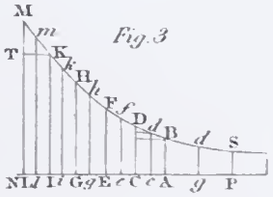


Fig. 5.

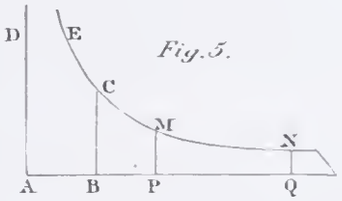


Fig. 6.

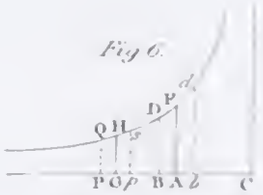
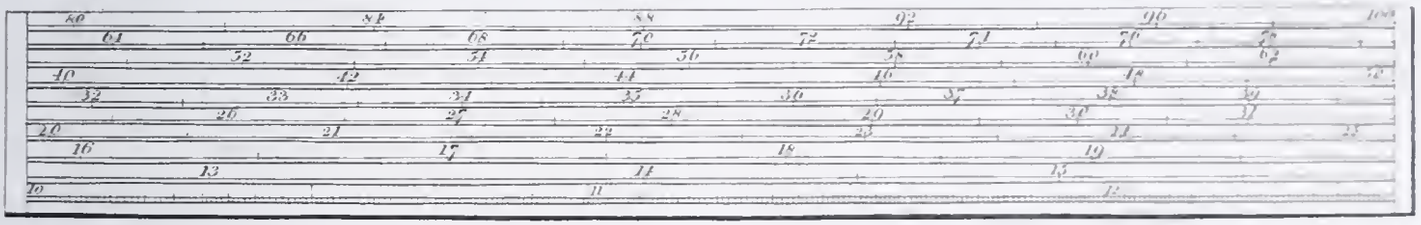


Fig. 7.



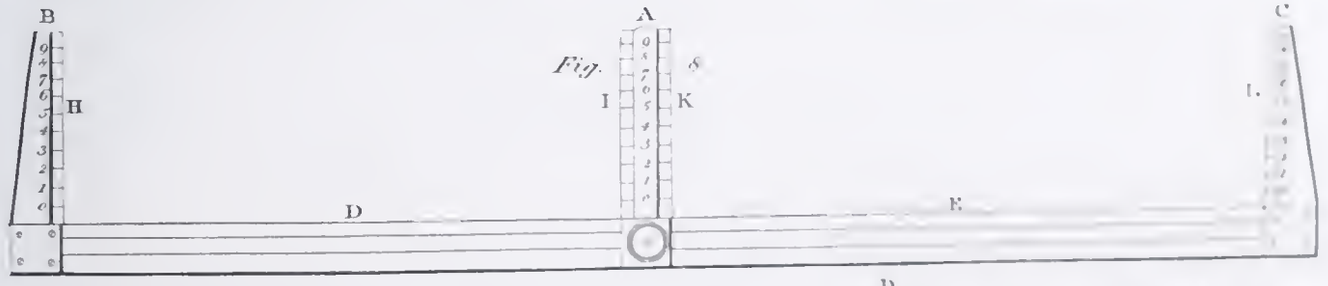


Fig. 8

Fig 9

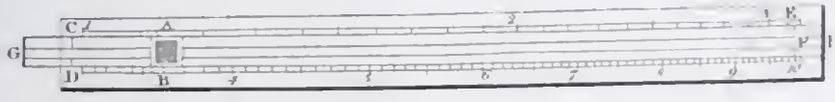


Fig 10

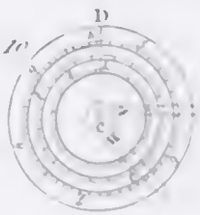
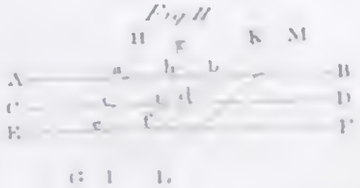


Fig 11



Log. North Pole, p. 97. of two other logs, which were tried by Captain Phipps: one invented by Mr Russel, the other by Foxon; both constructed upon this principle, that a spiral, in proceeding its own length in the direction of its axis through a resisting medium, makes one revolution round the axis; if therefore the revolutions of the spiral are registered, the number of times it has gone its own length through the water will be known. In both these the motion of the spiral in the water is communicated to the clockwork within board, by means of a small line fastened at one end to the spiral, which tows it after the ship, and at the other to a spindle, which sets the clockwork in motion. That invented by Mr Russel has a half spiral of two threads, made of copper, and a small dial of clockwork, to register the number of turns of the spiral. The other log has a whole spiral of wood with one thread, and a larger piece of clockwork with three dials, two of them to mark the distance, and the other divided into knots and fathoms, to show the rate by the half-minute glass, for the convenience of comparing it with the log. This kind of log will have the advantage of every other in smooth water and moderate weather; and it will be useful in finding the trim of a ship when alone, in surveying a coast in a single ship, or in measuring distances in a boat between headlands and shoals; but it is subject to other inconveniences, which will not render it a proper substitute for the common log.

Perpetual Log, a machine so called by its inventor, Mr Gottlieb of London, is intended for keeping a constant and regular account of the rate of a ship's velocity in the interval of heaving the log.

Plate CCXCVII. fig. 1. Fig. 1. is a representation of the whole machine; the lower part of which, EFG, is fixed to the side of the keel; H representing only the boundary line of the ship's figure. EF are the section of a wooden external case, left open at the ends KL, to admit the passage of the water during the motion of the ship. At M is a copper grating, placed to obstruct the entrance of any dirt, &c. into the machine. I is a section of a water wheel, made from 6 to 12 inches in diameter, as may be necessary, with floatboards upon its circumference, like a common water wheel, that turn by the resistance of the water passing through the channel LK. It turns upon a shouldered axis, represented by the vertical section at K. When the ship is in motion, the resistance of the water through the channel LK turns round the wheel I. This wheel, by means of a pinion, is connected with and turns the rod contained in the long copper tube N. This rod, by a pinion fixed at its upper extremity, is connected with and turns upon the whole system of wheels contained in the dial of the case ABCD. This dial, by means of the copper tube N, may be fixed to any convenient place aboard the ship. In the front of the dial are several useful circular graduations, as follow: The reference by the dotted line A has a hand which is moved by the wheels within, which points out the motion of the ship in fathoms of 6 feet each. The circle at B has a hand showing the knots, at the rate of 48 feet for each knot: and is to be observed with the half-minute glass at any time. The circle at C has a short and a long hand; the former of which points out the mile in land measure, and the latter or longer the number of knots contained in each mile, viz. 128, which is in the same proportion to a mile as 60 minutes to the hour in the reckoning. At *e*, a small portion of a circle is seen through the front plate called the *register*; which shows, in the course of 24 hours (if the ship is upon one tack) the distance in miles that she has run; and in the 24 hours the mariner need take but one observation, as this register serves as an useful check upon the fathoms, knots, and miles, shown upon the two other circles. Log.

f Is a plate showing 100 degrees or 6000 miles, and also acts as another register or check; and is useful in case of any mistake being made in observing the distant run by the other circles. The reckoning by these circles, without fear of mistake, may therefore be continued to nearly 12,000 miles.

A communication from this machine may easily be made to the captain's bedside, where by touching a spring only, a bell in the head ABCD will sound as many times in a half minute as the ship sails miles in an hour.

Log-Board, a sort of table, divided into several columns, containing the hours of the day and night, the direction of the winds, the course of the ship, and all the material occurrences that happen during the 24 hours, or from noon to noon; together with the latitude by observation. From this table the officers of the ship are furnished with materials to compile their journals.

Log-Book, a book into which the contents of the log-board is daily copied at noon, together with every circumstance deserving notice that may happen to the ship, either at sea or in a harbour. See NAVIGATION.

LOGARITHMS.

INTRODUCTION.

THE labour and time required for performing the arithmetical operations of multiplication, division, and the extraction of roots, were at one time considerable obstacles to the improvement of various branches of knowledge, and in particular the science of astronomy. But about the end of the 16th century, and the beginning of the 17th, several mathematicians began to consider by what means they might simplify these operations, or substitute for them others more easily performed. Their efforts produced some ingenious contrivances for abridging calculations, but of these the most complete by far was that of *John Napier Baron of Merchiston* in Scotland, who invented a system of numbers called *logarithms*, which were so adapted to the numbers to be multiplied, or divided, that these being arranged in the form of a table, each opposite to the numbers

Introduction.

number called its logarithm, the product of any two numbers in the table was found by the addition of their logarithms; and, on the contrary, the quotient arising from the division of one number by another was found by the subtraction of the logarithm of the divisor from that of the dividend; and similar simplifications took place in the still more laborious operations of involution and evolution. But before we proceed to relate more particularly the circumstances of this invention, it will be proper to give a general view of the nature of logarithms, and of the circumstances which render them of use in calculation.

Let there be formed two series of numbers, the one constituting a geometrical progression, the first term of which is unity or 1, and the common ratio any number whatever, and the other an arithmetical progression, the first term of which is 0, and the common difference also any number whatever; (but as a particular example we shall suppose the common ratio of the geometrical series to be 2, and the common difference of the arithmetical series 1), and let the two series be written opposite to each other in the form of a table, thus:

Geom. Prog.	Arith. Prog.
1	0
2	1
4	2
8	3
16	4
32	5
64	6
128	7
256	8
512	9
1024	10
2048	11
4096	12
&c.	&c.

The two series being thus arranged, the terms in the arithmetical series are called the *logarithms* of the corresponding terms of the geometrical series; that is, 0 is the logarithm of 1, and 1 is the logarithm of 2, and 2 is the logarithm of 4, and 3 that of 8, and so on.

From the manner in which the two series are related to each other, it will readily appear by induction that the logarithms of the terms of the geometrical series have the two following properties:

1. The sum of the logarithms of any two numbers or terms in the geometrical series is equal to the logarithm of that number, or term of the series, which is equal to their product.

For example, let the terms of the geometrical series be 4 and 32; the terms of the arithmetical series corresponding to them (that is, their logarithms) are 2 and 5; now the product of the numbers is 128, and the sum of their logarithms is 7; and it appears by inspection of the two series, that the latter number is the logarithm of the former, agreeing with the proposition we are illustrating. In like manner, if the numbers or terms of the geometrical series be 16 and 64, the logarithms of which are 4 and 6, we find from the table that $10=4+6$ is the logarithm of $1024=16\times64$; and so of any other numbers in the table.

2. The difference of the logarithms of any two numbers, or terms of the geometrical series, is equal to the logarithm of that term of the series which is equal to the quotient arising from the division of the one number by the other.

Take for example the terms 128 and 32, the logarithms of which are 7 and 5; the greater of these numbers divided by the less is 4, and the difference of their logarithms is 2; and by inspecting the two series, this last number will be found to be the logarithm of the former. In like manner, if the terms of the geometrical series be 1024 and 16, the logarithms of which are 10 and 4, we find that $1024\div16=64$, and that $10-4=6$; now it appears from the table that the latter number, viz. 6, is the logarithm of the former 64.

These two properties of logarithms, the second of which indeed is an immediate consequence of the first, enable us to find with great facility the product or the quotient of any two terms of a geometrical series to which there is adapted an arithmetical series, so that each number has its logarithm opposite to it, as in the preceding short table. For it is evident, that to multiply two numbers we have only to add their logarithms, and opposite to that logarithm which is the sum we shall find the product required. Thus, to multiply 16 by 128; to the logarithm of 16, which is 4, we add the logarithm of 128, which is 7, and opposite to the sum 11, we find 2048, the product sought. On the other hand, to divide any number in the table by any other number, we must subtract the logarithm of the divisor from that of the dividend, and look for the remainder among the logarithms, and opposite to it we shall find the number sought. Thus, to divide 2048 by 128; from 11, which is the logarithm of 2048 we subtract 7, the logarithm of 128, and opposite to the remainder 4 we find 16, the quotient sought.

Let us now suppose any number of geometrical means to be interposed between each two adjoining terms of the preceding geometrical series, and the same number of arithmetical means between every two adjoining terms of the arithmetical series; then, as the results will still be a geometrical and an arithmetical series, the interpolated terms of the latter will be the logarithms of the corresponding terms of the former, and the two new series will have the very same properties as the original series.

If we suppose the number of interpolated means to be very great, it will follow that among the terms of the resulting geometrical series, some one or other will be found nearly equal to any proposed number whatever. Therefore, although the preceding table exhibits the logarithms of 1, 2, 4, 8, 16, &c. but does not contain the logarithms of the intermediate numbers, 3, 5, 6, 7, 9, 10, &c. yet it is easy to conceive that a table might be formed by interpolation which should contain, among the terms of the geometrical series, all numbers whatever to a certain extent, (or at least others very nearly equal to them) together with their logarithms. If such a table were constructed, or at least if such terms of the geometrical progression were found together with their logarithms, as were either accurately equal to, or coincided nearly, with all numbers

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bers within certain limits (for example between 1 and 100000), then, as often as we had occasion to multiply or divide any numbers contained in that table we might evidently obtain the products or quotients by the simple operations of addition and subtraction.

The first invention of logarithms has been attributed by some to *Longomontanus*, and by others to *Juste Byrge*, two mathematicians who were cotemporary with *Lord Napier;* but there is no reason to suppose that either of these anticipated him, for *Longomontanus* never published any thing on the subject, although he lived thirty-three years after *Napier* had made known his discovery; and as to *Byrge*, he is indeed known to have printed a table containing an arithmetical and a geometrical progression written opposite to each other, so as to form in effect a system of logarithms of the same kind as those invented by *Napier*, without however explaining their nature and use, although it appears from the title he intended to do so, but was probably prevented by some cause unknown to us. But this work was not printed till 1620, six years after Napier had published his discovery.

It is therefore with good reason that *Napier* is now universally considered as the first, and most probably as the only inventor. The discovery he published in the year 1614 in a book entitled *Mirifici Logarithmorum Canonis Descriptio*, but he reserved the construction of the numbers till the opinion of the learned concerning his invention should be known. His work contains a table of the natural sines and cosines, and their logarithms for every minute of the quadrant, as also the differences between the logarithmic sines and cosines, which are in effect the logarithmic tangents. There is no table of the logarithms of numbers; but precepts are given, by which they, as well as the logarithmic tangents, may be found from the table of natural and logarithmic sines.

In explaining the nature of logarithms, *Napier* supposes some determinate line which represents the radius of a circle to be continually diminished, so as to have successively all possible values, and thus to be equal to every sine, one after another, throughout the quadrant. And he supposes this diminution to be effected by a point moving from one extremity towards the other extremity, (or rather some point very near it), with a motion that is not uniform, but becomes slower and slower, and such, that if the whole time between the beginning and the end of the motion be conceived to be divided into a very great number of equal portions, the decrements taken away in each of these shall be to one another as the respective remainders of the line. According to this mode of conceiving the line to decrease, it is easy to shew that at the end of any successive equal intervals of time from the beginning of the motion, the portions of the line which remain will constitute a decreasing geometrical progression.

Again, he supposes another line to be generated by a point which moves along it equably, or which passes over equal intervals of it in equal times. Thus the portions of the line generated at the end of any equal successive intervals of time from the beginning of the motion will form a series of quantities in arithmetical progression. Now if the two motions be supposed to begin together, at the end of any equal intervals of time the remainders of the one line will form a series of quantities in geometrical progression, and the corresponding portions generated of the other line, will constitute a series in arithmetical progression, so that the latter will be the logarithms of the former. And as the terms of the geometrical progression decrease continually from radius, which is the greatest term, to 0, while the terms of the corresponding arithmetical progression increase from 0 upwards, according to Napier's system the logarithm of radius is 0, and the logarithms of the sines from radius down to 0, are a series of numbers increasing from 0 to infinite.

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The velocities or degrees of quickness with which the motions commence may have to each other any ratio whatever, and by assuming different ratios we shall have different systems of logarithms. Napier supposed the velocities to be equal; but the system of logarithms produced in consequence of this assumption having been found to have some disadvantages, it has been long disused, and a more convenient one substituted instead of it, as we shall presently have occasion to explain.

Napier's work having been written in Latin was translated into English by *Mr Edward Wright*, an ingenious mathematician of that period, and the inventor of the principles of what is commonly though erroneously called *Mercator's sailing*. The translation was sent to Napier for his perusal, and returned with his approbation, and the addition of a few lines, intimating that he intended to make some alterations in the system of logarithms in a second edition. Mr Wright died soon after he received back his translation; but it was published after his death, in the year 1616, accompanied with a dedication by his son to the East India Company, and a preface by *Henry Briggs*, who afterwards distinguished himself so much by his improvement of logarithms. *Mr Briggs* likewise gave in this work the description and draught of a scale which had been invented by *Wright*, as also various methods of his own for finding the logarithms of numbers, and the contrary, by means of Napier's table, the use of which had been attended with some inconvenience on account of its containing only such numbers as were the natural sines to every minute of the quadrant and their logarithms. There was an additional inconvenience in using the table, arising from the logarithms being partly positive and partly negative; the latter of these was, however, well remedied by *John Speidell* in his *New Logarithms*, first published in the year 1619, which contained the sines, cosines, tangents, cotangents, secants, and cosecants, and given in such a form as to be all positive; and the former was still more completely removed by an additional table, which he gave in the sixth impression of his work, in the year 1624, and which contained the logarithms of the whole numbers 1, 2, 3, 4, &c. to 1000, together with their differences and arithmetical complements, &c. This table is now commonly called *hyperbolic logarithms*, because the numbers serve to express the areas contained between a hyperbola and its asymptote, and limited by ordinates drawn parallel to the other asymptote. This name, however, is certainly improper, as the same spaces may represent the logarithms of any system whatever, (see FLUXIONS, § 152. Ex. 5.).

In 1719 *Robert Napier*, son of the inventor of logarithms, published a second edition of his father's *Logarithmorum Canonis Descriptio*. And along with this

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this the promised *Logarithmorum Canonis Constructio*, and other pieces written by his father and Mr Briggs. An exact copy of the same two works in one volume was also printed in 1620 at Lyons in France. In 1618 or 1619 *Benjamin Ursinus*, mathematician to the elector of Brandenburg, published Napier's tables of logarithms in his *Cursus Mathematicus*, to which he added some tables of proportional parts; and in 1624, he printed his *Trigonometria*, with a table of natural sines, and their logarithms of the Napierean kind and form, to every ten seconds of the quadrant.

In the same year, 1624, the celebrated *John Kepler* published at Marpurg, logarithms of nearly the same kind, under the title of *Chilias Logarithmorum ad totidem Numeros Rotundos, præmissa Demonstratione legitima Ortus Logarithmorum eorumque Usus*, &c. and in the following year he published a supplement to this work. In the preface to this last he says, that several of the professors of mathematics in Upper Germany, and more especially those of them who were somewhat advanced in years, and were grown averse to new methods of reasoning that carried them out of the old doctrines and principles with which habit had rendered them familiar, doubted in some degree whether Napier's demonstration of the property of logarithms was perfectly true, and whether the application of them to trigonometrical calculations might not be unsafe and lead the calculator who should trust in them to erroneous results; and in either case, whether the doctrine were true or not, they considered Napier's demonstration of it as illegitimate and unsatisfactory. This opinion induced *Kepler* to compose the above-mentioned work, in which the whole doctrine is treated in a manner strictly geometrical, and free from the considerations of motion which the German mathematicians had objected to (and not without reason) in Napier's mode of treating the subject.

On the publication of Napier's Logarithms, *Mr Henry Briggs*, some time professor of geometry in Gresham college London, and afterwards Savilian professor of geometry at Oxford (whom we have already mentioned) applied himself with great earnestness to their study and improvement, and it appears that he had projected at an early period that advantageous change in the system which has since taken place. From the particular view which Napier took of the subject, and the manner in which he conceived logarithms to be generated, it happened that in his system, the logarithms of a series of numbers which increased in a decuple ratio, (as 1, 10, 100, 1000, &c.) formed a decreasing arithmetical series, the common difference of the terms of which was 2.3025851. But it occurred to Briggs that it would be better and more conformable to the received decimal notation, to adopt a system in which the logarithms of the terms of such a geometrical series should differ from each other by unity or 1. This idea Briggs communicated to the public in his lectures, and also to Napier himself. He even went twice to Edinburgh to see him, and to converse with him upon the subject; and on his first visit Napier said that he had also formerly thought of the same improvement, but that he chose to publish the logarithms he had previously calculated, till such time as his health and convenience would allow him to make others more commodious. And whereas in the change which Briggs proposed, it was intended to make the logarithms of the sines to increase from 0 (the logarithm of radius) to infinity, while the sines themselves should decrease, it was suggested to him by Napier that it would be better to make them increase so that 0, instead of being the logarithm of radius, should be the logarithm of 1; and that 100000, &c. should be the logarithm of radius; and this Briggs admitted would be an improvement; and having changed the numbers he had already calculated so as to make them suit Napier's modification of his plan, he returned with them next year to Edinburgh, and submitted them to his perusal.

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It appears therefore that Briggs was the inventor of this improved system of logarithms which has since been universally adopted, and that the only share that Napier had in it was his suggesting to Briggs to begin with the low number 1, and to make the logarithms, or the artificial numbers, as Napier had always called them, to increase with the natural numbers, instead of decreasing, which made no alteration in the figures, but only in their affections or signs, changing them from negative to positive.

On Briggs's return from Edinburgh, in 1617, he printed the first thousand logarithms to eight places of figures, besides the index, with the title of *Logarithmorum Chilias prima;* but these seem not to have been published till after the death of Napier, which happened in 1618, for in his preface he expresses a hope, that the circumstances which led to a change in the system would be explained in Napier's posthumous work, which was presently to appear. But although Napier had intimated in a note he had given in Wright's translation of the *Canon Mirificus*, as well as his *Rabdologia*, printed in 1617, that he intended to alter the scale, yet he altogether omits to state that Briggs either was the first to think of this improvement, or at least to publish it to the world. And as the same silence on this point was observed in Napier's posthumous work published in 1619 by his son, Briggs took occasion in the preface to his *Arithmetica Logarithmica* to assert his claims to the improvement he had now carried into execution.

The studied silence which Napier seems to have observed respecting the improvement of the system, which Briggs had communicated to him, has given just reason to suspect that he wished to be considered as the author of that improvement, as well as the original inventor. But although it is possible that he thought of it as soon as Briggs, it would seem to have been no more than justice, if, when announcing his intended change of the scale, he had acknowledged that the same idea had occurred to Briggs as well as to himself.

In 1620 *Mr Edmund Gunter* published his *Canon of Triangles*, which contains the artificial or logarithmic sines and tangents to every minute to seven places of figures besides the index, the logarithm of radius being 10. These logarithms are of the kind which had been agreed upon between Napier and Briggs, and they were the first tables of logarithmic sines and tangents that were published of this sort. Gunter also in 1623 reprinted the same in his book *de Sectore et Radio*, together with the *Chilias prima* of Briggs; and in the same year he applied the logarithms of numbers, sines, and tangents, to straight lines drawn upon a ruler. This instrument is now in common use for navigation and other purposes, and is commonly called *Gunter's scale*.

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The discoveries in Logarithms were first carried to France by *Mr Edmund Wingate*, but not first of all as he says in the preface to his book. He published at Paris in 1624 two small tracts in the French language upon logarithms, and these were reprinted with improvements at London in 1626.

In the year 1624, Briggs published his *Arithmetica Logarithmica*, a stupendous work considering the short time he had been in preparing it. He here gives the logarithms of 30000 natural numbers to fourteen places of figures, besides the index; namely, from 1 to 20000 and from 90000 to 100000, together with the differences of the logarithms. He also gives an ample treatise on their construction and use, and he earnestly solicits others to undertake the computation of the intermediate numbers, offering to give instructions, and paper ready ruled for that purpose, to any person inclined to contribute to the completion of so valuable a work. By this invitation he had hopes of collecting materials for the logarithms of the intermediate 70000 numbers, while he should employ his time upon the Canon of Logarithmic sines and tangents, and so carry on both works at once.

Soon after this, *Adrian Vlacq* or *Flack* of Gouda in Holland completed the intermediate 70 chiliads, and republished the *Arithmetica Logarithmica* in 1627 and 1628, with these intermediate numbers, making in all, the logarithms of all numbers to 100,000, but only to 10 places of figures. To these was added a table of artificial sines, tangents, and secants, to every minute of the quadrant.

Briggs himself lived also to complete a table of logarithmic sines and tangents, to the 100th part of every degree, to fourteen places of figures besides the index, together with a table of natural sines to the same parts to fifteen places, and the tangents and secants of the same to ten places, with the construction of the whole. But his death, which then happened, prevented him from completing the application and uses of them. However, when dying, he committed the performing of this office to his friend *Henry Gellibrand*, who accordingly added a preface, and the application of the logarithms to plane and spherical trigonometry. The work was called *Trigonometria Britannica*, and was printed at Gouda in the year 1633 under the care of *Adrian Vlacq*.

In the same year, 1633, *Adrian Vlacq* printed a work of his own, called *Trigonometria Artificialis, sive Magnus Canon Triangulorum Logarithmicus ad Decadas Secundorum Scrupulorum Constructus*. This work contains the logarithmic sines and tangents to 10 places of figures, with their differences for every ten seconds in the quadrant. It also contains Brigg's table of the first 20000 logarithms to ten places, besides the index, with their differences; and to the whole is prefixed a description of the tables and their applications, chiefly extracted from Briggs's *Trigonometria Britannica*, which we have already mentioned.

Gellibrand published also, in 1635, *An Institution Trigonometrical*, containing the logarithms of the first 10,000 numbers, with the natural sines, tangents, and secants, and the logarithmic sines and tangents for degrees and minutes; all to seven places of figures besides the index.

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The writers, whose works we have hitherto noticed, were for the most part computors of logarithms. But the system best adapted to practice being now well ascertained, and the labour of constructing the table accomplished, succeeding writers on the subject have had little more to do than to give the tables in the most convenient form. It is true that, in consequence of the numerous discoveries which were afterwards made in mathematics, particularly in the doctrine of series, great improvements were made in the method of computing logarithms; but these, for the most part, came too late to be of use in the actual construction of the table, although they might be applied with advantage to verify calculations previously performed by methods much more laborious.

As it is of importance that such as have occasion to employ logarithms should know what works are held in estimation on account of their extent and accuracy, we shall enumerate the following.

1. Sherwin's *Mathematical Tables*, in 8vo. These contain the logarithms of all numbers to 101,000; and the sines, tangents, secants, and versed sines, but natural and logarithmic, to every minute of the quadrant. The third edition, printed in 1742, which was revised by Gardiner, is esteemed the most correct; but, in the fifth edition, the errors are so numerous, that no dependence can be placed upon it when accuracy is required.

2. Gardiner's Tables of Logarithms for all numbers to 101,000, and for the sines and tangents to every ten seconds of the quadrant; also for the sines of the first 72 minutes to every single second, &c. This work, which is in quarto, was printed in 1742, and is held in high estimation for its accuracy.

3. An edition of the same work, with some additions, printed in 1770 in Avignon in France. The tables in both editions are to seven places of figures.

4. *Tables Portatives de Logarithmes, publiée à Londres, par Gardiner, augmentées et perfectionées dans leur disposition, par M. Callet.*—This work is most beautifully printed in a small octavo volume, and contains all the tables in Gardiner's quarto volume; with some additions and improvements.

5. Dr Hutton's Mathematical Tables, containing common hyperbolic and logistic logarithms, &c.—This work has passed through several editions, under the care of the learned author: it is perhaps the most common of any in this country, and is deservedly held in the highest estimation, both on account of its accuracy, and the very valuable information it contains respecting the history of logarithms, and other branches of mathematics connected with them.

6. Taylor's Table of Logarithmic Sines and Tangents to every second of the quadrant; to which is prefixed a table of logarithms from 1 to 100,000, &c.—This is a most valuable work; but being a very large quarto volume, and also very expensive, it is less adapted to general use than the preceding, which is an octavo, and may be had at a moderate price.

7. *Tables portatives des logarithmes, contenant les logarithmes des nombres depuis 1 jusqu' à 108,000; les logarithmes des sinus et tangentes, de seconde en seconde pour les cinq premiers degrees, de dix en dix secondes pour tous les degrees du quart-de cercle, et suivant la nouvelle*

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nouvelle division centesimale de dix-millieme en dix millieme, &c. *par* Callet.—This work, which is in octavo, may be reasonably expected to be very accurate, it being printed in the stereotype manner, by *Didot*.

In addition to these, it is proper that we should notice a stupendous work relating to logarithms, originally suggested by the celebrated *Carnot*, in conjunction with *Prieur de la Côte d'Or*, and *Brunet de Montpelier*, about the beginning of the French revolution. This enterprise was committed in the year 1794, to the care of *Prony*, a French mathematician of great eminence, who was *not only to compose tables which should leave nothing to be desired with respect to accuracy, but to make them the most extended and most striking monument of calculation which had ever been executed or ever imagined**. It appears that two manuscript copies of the work were formed, composed of 17 volumes large folio; and contained, besides an introduction, the following tables.

* *Nichols. Journ.* vol. v. 4to series, p. 311.

1. The natural sines for each 10,000th part of the quadrant, calculated to twenty-five places of decimals, to be published with twenty-two decimals and five columns of differences.

2. The logarithms of these sines, calculated to fourteen decimals, with five columns of differences.

3. The logarithms of the ratios of the sines to the ares for the first five thousand 100,000th parts of the quadrant, calculated to fourteen decimal places, with three columns of differences.

4. The logarithms of the tangents corresponding with the logarithms of the sines.

5. The logarithms of the ratios of the tangents to the ares, calculated like those of the third article.

6. Logarithms of numbers from 1 to 100,000 calculated to nineteen places of decimals.

7. The logarithms of numbers from 100,000 to 200,000, calculated to 24 decimals, in order to be published to 12 decimals and three columns of differences.

The printing of this work was begun at the expence of the French government, but was suspended at the fall of the assignats; whether it has been since resumed we cannot positively say, but it certainly is not yet completed.

SECT. I.

OF THE NATURE OF LOGARITHMS AND THEIR CONSTRUCTION.

We have already shewn that the properties of logarithms are deducible from those of two series, the terms of one of which form a geometrical progression, and those of the other an arithmetical progression; and as this manner of treating the subject is simple, it is perhaps the best adapted of any to such of our readers as have not pursued the study of mathematics to any great extent. We shall now shew how, from the same principles, the logarithm of any proposed number whatever may be found.

The first step to be taken in constructing a system of logarithms is to assume the logarithm of some determinate number, besides that of unity or 1, which must necessarily be 0. From the particular view which *Napier* took of the subject, he was led to assume unity for the logarithm of the number 2.718282, by which it happened that the logarithm of 10 was 2.302585, and this assumption being made, the form of the system became determinate, and the logarithm of every number fixed to one particular value.

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Mr Briggs however observed, that it would be better to assume unity for the logarithm of 10, instead of making it the logarithm of 2.718282, as in Napier's system, and hence the logarithms of the terms of the geometrical progression

1, 10, 100, 1000, 10000, &c.

were necessarily fixed to the corresponding terms of this arithmetical progression,

0, 1, 2, 3, 4, &c.

That is, the logarithm of 1 being 0, and that of 10 being 1, the logarithm of 100 is 2, and that of 1000 is 3, and so on.

The logarithms of the terms of the progression, 1, 10, 100, 1000, &c. being thus determined; in order to form the logarithms of the numbers between 1 and 10, and between 10 and 100, and so on, we must conceive a very great number of geometrical means to be interposed between each two adjoining terms of the preceding geometrical series, and as many arithmetical means between the corresponding terms of the arithmetical series; then, like as the terms of the arithmetical series 0, 1, 2, 3, &c. are the logarithms of the corresponding terms of the geometrical series 1, 10, 100, 1000, &c. the interpolated terms of the former will also be the logarithms of the corresponding interpolated terms of the latter. Now as by supposing the number of means interposed between each two terms of the geometrical series to be sufficiently great, some one or other of them may be found which will be very nearly equal to any proposed number; it is evident that to find the logarithm of such a number, we have only to seek for one of the interpolated means which is very nearly equal to it, and to take the logarithm of that mean as a near value of the logarithm required.

As a particular example, let it be required to find the logarithm of the number 5, according to Briggs's system.

First step of the process.—The number 5 is between 1 and 10, the logarithms of which we already know to be 0 and 1: Let a geometrical mean be found between the two former, and an arithmetical mean between the two latter. The geometrical mean will be the square root of the product of the numbers 1 and 10, which is 3.162277; and the arithmetical mean will be half the sum of the logarithms 0 and 1, which is 0.5; therefore the logarithm of 3.162277 is 0.5. But as the mean thus found is not sufficiently near to the proposed number, we must proceed with the operation as follows:

Second step.—The number 5, whose logarithm is sought is between 3.162277, the mean last found, and 10, the logarithms of which we know to be 0.5 and 1; we must now find a geometrical mean between the two former, and an arithmetical mean between the two latter. The one of these is $\sqrt{(3.162277 \times 10)} = 5.623413$, and the other is $\frac{1+0.5}{2} = 0.75$; therefore the logarithm of 5.623413 is 0.75.

Third step.—We have now obtained two numbers, namely

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namely 3.162277 and 5.623413, one on each side of 5, together with their logarithms 0.5 and .075, we therefore proceed exactly as before, and accordingly we find the geometrical mean, or $\sqrt{(3.162277 \times 5.623413)}$, to be 4.216964, and the arithmetical mean, or $\frac{0.5+0.75}{2}$ to be 0.625; therefore the logarithm of 4.216964 is 0.625.

Fourth step.—We proceed in the same manner with the numbers 4.216964, and 5.623413 (one of which is less, and the other greater than 5) and their logarithms 0.625 and 0.75, and find a new geometrical mean, viz. 4.869674, and its corresponding arithmetical mean, or logarithm, 0.6875.

We must go on in this way till we have found twenty-two geometrical means, and as many corresponding arithmetical means or logarithms. And that we may indicate how these are found from each other, let the numbers 1 and 10 be denoted by A and B, and their geometrical means taken in their order by C, D, E, &c. then the results of the successive operations will be as in the following table:

		Numbers.	Logarithms.
A =		1.000000	0.0000000
B =		10.000000	1.0000000
C = $\sqrt{AB}$ =		3.162277	0.5000000
D = $\sqrt{BC}$ =		5.623413	0.7500000
E = $\sqrt{CD}$ =		4.216964	0.6250000
F = $\sqrt{DE}$ =		4.869674	0.6875000
G = $\sqrt{DF}$ =		5.232991	0.7187500
H = $\sqrt{FG}$ =		5.048065	0.7031250
I = $\sqrt{FH}$ =		4.958069	0.6953125
K = $\sqrt{HI}$ =		5.002865	0.6992187
L = $\sqrt{IK}$ =		4.980416	0.6972656
M = $\sqrt{KL}$ =		4.991627	0.6982421
N = $\sqrt{KM}$ =		4.997242	0.6987304
O = $\sqrt{KN}$ =		5.000052	0.6989745
P = $\sqrt{NO}$ =		4.998647	0.6988525
Q = $\sqrt{OP}$ =		4.999350	0.6989135
R = $\sqrt{OQ}$ =		4.999701	0.6989440
S = $\sqrt{OR}$ =		4.999876	0.6989592
T = $\sqrt{OS}$ =		4.999963	0.6989668
V = $\sqrt{OT}$ =		5.000008	0.6989707
W = $\sqrt{TV}$ =		4.999984	0.6989687
X = $\sqrt{WV}$ =		4.999997	0.6989697
Y = $\sqrt{VX}$ =		5.000003	0.6989702
Z = $\sqrt{XY}$ =		5.000000	0.6989700

As the last of these means, viz. Z, agrees with 5, the proposed number, as far at least as the sixth place of decimals, we may safely consider them as very nearly equal, therefore their logarithms will also be very nearly equal, that is, the logarithm of 5 will be 0.6989700 nearly.

In performing the operations indicated in the preceding table, it will be necessary to find the geometrical means at the beginning to many more figures than are here put down, in order to obtain at last a result true to 7 decimal places. Thus it appears that the labour of computing logarithms by this method is indeed very great. It is, however, that which was employed by Briggs and Vlacq in the original construction of logarithms; but since the period in which they lived, others more easy have been found, as we shall presently have occasion to explain.

The logarithm of any number whatever may be found by a series of calculations similar to that which we have just now explained. But in constructing the table it would only be necessary to have recourse to this method in calculating the logarithms of prime numbers; for as often as the logarithm of a number which was the product of other numbers, whose logarithms were known, was required, it would be immediately obtained by adding together the logarithms of its factors. On the contrary, if the logarithm of the product of two numbers were known, and also that of one of its factors, the logarithm of the other factor would be obtained from these, by simply taking their difference.

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From this last remark it is obvious, that having now found the logarithm of 5, we can immediately find that of 2; for since 2 is the quotient of 10 divided by 5, its logarithm will be the difference of the logarithms of 10 and 5; now the logarithm of 10 is 1, and the logarithm of 5 is 0.6989700, therefore the logarithm of 2 is 0.3010300.

Having thus obtained the logarithms of 2 and 5, in addition to those of 10, 100, 1000, &c. we may thence find the logarithms of innumerable other numbers. Thus, because $4=2\times2$, the logarithm of 4 will be the logarithm of 2 added to itself, or will be twice the logarithm of 2. Again, because $5\times10=50$, the logarithm of 50 will be the sum of the logarithms of 5 and 11. In this manner it is evident we may find the logarithms of $8=2\times4$, of $16=2\times8$, of $25=5\times5$, and of as many more such numbers as we please.

Besides the view we have hitherto taken of the theory of logarithms, there are others under which it has been presented by different authors. Some of these we proceed to explain, beginning with that in which they are defined to be the *measures of ratios;* but to see the propriety of this definition, it must be understood what is meant by the measure of a ratio.

According to the definition of a compound ratio, as laid down by writers on geometry, if there be any number of magnitudes A, B, C, D, which are continual proportionals, or such that the ratio of A to B is equal to the ratio of B to C, and that again is equal to the ratio of C to D, and so on, the ratio of the first of these magnitudes A to the third C is considered as made up of two equal ratios, each equal to the ratio of the first A to the second B. And in like manner the ratio of the first A to the fourth D is considered as made up of three equal ratios, each equal to the ratio of the first to the second, and so on. (See GEOMETRY, Sect. III. Def. 10, 11, and 12.). Thus, to take a particular example in numbers, because the ratio of 81 to 3 may be considered as made up of the ratio of 81 to 27, and of 27 to 9, and of 9 to 3, which three ratios are equal among themselves, (GEOMETRY, Sect. III. Def. 4.) the ratio of 81 to 3 will be triple the ratio of 9 to 3; and in like manner the ratio of 27 to 3 will be double the ratio of 9 to 3. Also, because the ratios of 1000 to 100, 100 to 10, 10 to 1, are all equal, the ratio of 1000 to 1 will be three times as great as the ratio of 10 to 1; and the ratio of 100 to 1 will be twice as great; and so on.

Taking this view of ratios, and considering them as a particular species of quantities, made up of others of the same kind, they may evidently be compared with each other, in respect of their magnitudes, in the same manner, as we compare lines or quantities of any kind whatever.

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whatever. And as when estimating the relative magnitudes of two quantities, two lines for example, if we find that the one contains five such equal parts as the other contains seven, we say the one line has to the other the proportion of 5 to 7; so, in like manner, if two ratios be such, that the one can be resolved into five equal ratios, and the ether into seven of the same ratios, we may conclude that the magnitude of the one ratio is to that of the other as the number 5 to the number 7; and a similar conclusion may be drawn, when the ratios to be compared are any multiples whatever of some other ratio.

It is well known that there may be lines and other quantities, which, as they admit of no common measure, are said to be incommensurable to each other; and the same will also happen to ratios: That is, there may be two ratios such that into whatever number of equal ratios the one is divided, the other cannot possibly be exactly equal to a ratio composed of any number of these. We may however conceive the number of equal ratios into which the one is divided to be so great, that a certain number of them shall compose a ratio more nearly equal to the other ratio than by any assignable difference. Therefore, like as we can always find numbers which shall have among themselves, either accurately, or as nearly as we please, the same ratios as any number of lines or other magnitudes have to each other, and which therefore may be taken as the measures or representatives of the lines; so also, corresponding to any system of ratios, there may be always found a series of numbers which will have the same proportions among themselves as the ratios have to each other, and which may in like manner be called the *measures of the ratios*.

Let us now suppose that unity, or 1, is assumed as the common consequent of all ratios whatever; and that the ratio of 10 (or some particular number) to 1 is compounded of a very great number of equal ratios, as for example 1000,000: then, as each of these will be very near to the ratio of equality, (for it will be the ratio of the first term to the second of a series of one million and one continued proportionals, the first of which is 10 and last 1), it will follow, and is easy to conceive, that the ratios of all other numbers to unity will each be very nearly equal to some multiple of that small ratio. And by supposing the number of small equal ratios of which the ratio of 10 to 1 is composed to be sufficiently great, the ratios of all other numbers to unity may be as nearly equal to ratios which are multiples of that small ratio as we please. Let us still suppose, however, for the sake of illustration, that the number of small ratios contained in that of 10 to 1 is 1000,000; then, as it may be proved that the ratio of 2 to 1 will be very nearly the same as a ratio composed of 301030 of these; and that the ratio of 3 to 1 will be nearly equal to a ratio composed of 477121 of them, and that the ratio of 4 to 1 will be nearly equal to a ratio composed of 602060 of them, and so on; these numbers, viz. 1000000, 301030, 477121, and 602060, or any other numbers proportional to them, will be the *measures* of the ratios of 10 to 1, 2 to 1, 3 to 1, and 4 to 1, respectively; and the same quantities will also be what have been called the *logarithms* of the ratios; for the word *logarithm*, if regard be had to its etymology, is λογῶν ἀριθμοί, or the numbers of small and equal ratios (or *ratiunculæ* as they have been called) contained in the several ratios of quantities one to another.

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We have, for the sake of illustration, assumed 1000000 as the measure of the ratio of 10 to 1, by which it happens, as already observed, that the measures of the ratios of 2 to 1, 3 to 1, &c. are 301030 and 477121 respectively; as, however, these measures are not absolute, but relative quantities, we may assume any other numbers whatever instead of these, provided they have the same proportions to each other as these numbers have among themselves. Accordingly, we may assume 1 as the measure or logarithm of the ratio of 10 to 1; and then the logarithms of the ratios of 2 to 1, 3 to 1, &c. instead of being 301030, 477121, &c. will be .301030 and .477121, &c. respectively, that is, each will be the one-millionth of what it was before.

In *Briggs's* system, the logarithm of the ratio of 10 to 1, or, to speak briefly, the logarithm of 10, is unity; but we are at liberty to assume any number whatever, as that whose logarithm shall be unity. Napier, in consequence of his particular views of the subject, chose the number 2.718282; and hence it happens that the logarithms of the ratios are expressed by different numbers in the two systems.

It yet remains for us to shew the identity of the properties of logarithms, as explained in the two different views we have now given of the subject; and this may be done as follows.

Let A and B denote any two numbers. The ratio of their product to unity, that is, the ratio of $A \times B$ to 1, is compounded of the ratio of $A \times B$ to B, and of B to 1; (see GEOMETRY, Part III. Def. 10.) but since $A \times B$, B, A, and 1, are four proportionals, the ratio of $A \times B$ to B is equal to the ratio of A to 1. Therefore the ratio of $A \times B$ to 1 is compounded of the ratio of A to 1 and of B to 1; and consequently the logarithm of the ratio of $A \times B$ to 1 will be equal to the sum of the logarithms of the ratios of A to 1, and of B to 1; or, in other words, the logarithm of $A \times B$ will be the sum of the logarithms of A and B.

And because log. $(A \times B) =$ log. A + log. B, therefore, log. B = log. $(A \times B)$ — log. A. In this equation let $\frac{C}{D}$ be substituted for B, and D for A, then, (because $A \times B = D \times \frac{C}{D} = C$) we have log. $\frac{C}{D}$ = log. C — log. D.

We have now given a short sketch of the theory of logarithms as deducible from the doctrine of ratios. It was in this way that the celebrated Kepler treated the subject according to the strictest rules of geometrical reasoning; and in this he has been followed by Mercator, Halley, Cotes, as well as by other mathematicians of later times, as by Mr Baron Maseres, in his "Elements of Plane Trigonometry," a work in which the whole theory of logarithms is treated with all that perspicuity and accuracy which characterize the ingenious author's various writings. The same mode of treating the subject was likewise adopted by that excellent geometrician Dr Robert Simson, as appears by a short tract in Latin, written by him and published in his posthumous works. As, however, the doctrine of ratios is of a very abstract nature, and the mode of reasoning upon which it has been established is of a peculiar and subtle kind, we presume that the greater number of readers

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readers will think this view of the subject less simple and natural than the following, in which we mean to deduce the theory of logarithms, as well as the manner of computing them, from the properties of the exponents of powers.

If we attend to the common scale of notation in arithmetic, we shall find that it is so contrived as to express all numbers whatever by means of the powers of the number 10, which is the root of the scale, and the nine digits which serve as coefficients to these powers. Thus, if R denote 10, the root of the scale, so that R^2 will denote 100, and R^3 1000, and so on, the number 471509 is otherwise expressed by $4R^5+7R^4+1R^3+5R^2+0R^1+9R^0$, which is equivalent to $4R^5+7R^4+R^3+5R^2+9$. Again, the mixt number 371.243 is expressed by $3R^2+7R^1+R^0+\frac{2}{R}+\frac{4}{R^2}+\frac{3}{R^3}$, or by $3R^2+7R^1+R^0+2R^{-1}+4R^{-2}+3R^{-3}$. As to vulgar fractions, by transforming them to decimals, they may be expressed in the same manner. Thus $\frac{3}{8}=.375=3R^{-1}+7R^{-2}+5R^{-3}$. Also $\frac{2}{3}=.666$, &c.$=6R^{-1}+6R^{-2}+6R^{-3}+$&c.

Although the number 10 has been fixed upon as the root of the scale of notation, any other number may be employed to express all numbers whatever in the same manner; and some numbers are even preferable to 10. Thus, making 8 the root of a scale, and denoting it by R, the number 2735, when expressed according to this scale, is $5R^3+2R^2+5R^1+7R^0$, or $5R^3+2R^2+5R+7$; and here we may observe, that if a number greater than 10 were assumed as the root of the scale of notation, it would be necessary to adopt some new numeral characters in addition to those in common use, and if a smaller number were assumed, we might dispense with some of those we already have.

But instead of expressing all numbers by the sums of certain multiples of the successive powers of some particular number, we may also express them, if not accurately, at least as near as we please, by a single power, whole or fractional, of any positive number whatever, which may be either whole or fractional, but must not be unity.

Let us take, for example, 2 as the number, by the powers of which all others are to be expressed. Then it may be shewn that the numbers, 1, 2, 3, &c. are all expressible by the powers of 2, as follows.

$1=2^0$	$6=2^{2.58496}$ nearly
$2=2^1$	$7=2^{2.8073}$ nearly
$3=2^{1.58496}$, nearly	$8=2^3$
$4=2^2$	$9=2^{3.1699}$
$5=2^{2.3219}$, nearly	$10=2^{3.3219}$ nearly,

and so on. And if instead of 2 we take the number 10, then we have

$1=10^0$	$6=10^{.77815}$
$2=10^{.30103}$	$7=10^{.84510}$
$3=10^{.47712}$	$8=10^{.90309}$
$4=10^{.60205}$	$9=10^{.95424}$
$5=10^{.69897}$	$10=10^1$.

Hence we may conclude, that if r be put for some determinate number, and n for any indefinite positive number, whole or fractional, it is always possible to find another number N, such that the number r being raised to the power N shall either be exactly equal to n, or shall be as near to it as we please; that is, we shall have $r^N=n$.

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When numbers are expressed in this way by the powers of some given number r; *the exponent of that power of r which is equal to any assigned number is called the logarithm of that number.* Therefore, if $r^N=n$, (n being put for any number) then N will be the logarithm of the number n.

The logarithms which are produced by giving to r some determinate value constitute a *system* of logarithms, and the constant number r, from which the system is formed, is called the *base* or *radical* number of the system.

The properties of logarithms may readily be deduced from the above definition as follows. Let a and b be put for any two numbers, and A and B for their logarithms; then, r being supposed to denote the base, or radical number of the system, we have $a=r^A$ and $b=r^B$: now if we take the product of a and b, we have $ab=r^A\times r^B=r^{A+B}$; but according to the definition, A+B is the logarithm of ab, (for it is the index of that power of r which is equal to ab) therefore, *the sum of the logarithms of any two numbers a and b is the logarithm of their product a b.* Again, we have $\frac{a}{b}=\frac{r^A}{r^B}=r^{A-B}$, but here A—B is the index of that power of r which is equal to $\frac{a}{b}$; therefore, A—B is the logarithm of $\frac{a}{b}$; hence, *if one number a be divided by another number b, the excess of the logarithm of the dividend above that of the divisor is equal to the logarithm of the quotient $\frac{a}{b}$.*

Let n express any number whatever, then raising both sides of the equation $a=r^A$ to the nth power, we have $a^n=(r^A)^n=r^{nA}$; but here nA is manifestly the logarithm of a^n; therefore, *the logarithm of a^n, any power of a number, is the product of the logarithm of the number by n, the index of the power. And this must evidently be true, whether that index be a whole number, or a fraction, either positive or negative.*

From these properties it is easy to see in what manner a table that exhibits the logarithms of all numbers within certain limits may be applied to simplify calculations; for since the sum of the logarithms of any two numbers is equal to the logarithm of their product, it follows, that as often as we have occasion to find the product of two or more numbers, we have only to add their logarithms into one sum, taking them from the table, and to look in the table for the number whose logarithm is equal to that sum, and this number will be the product required. Also, because the excess of the logarithm of the dividend above that of the divisor is equal to the logarithm of the quotient; as often as we have occasion to divide one number by another, we have only

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only to subtract the logarithm of the divisor from that of the dividend, and opposite to that logarithm in the table, which is the remainder, we shall find the quotient.

As the logarithm of any power of a number is the product of the logarithm of the number, and the index of the power; and, on the contrary, the logarithm of any root of a number is the quotient found by dividing the logarithm of the number by the index of the root; it follows, that we may find any power or root of a number, by multiplying the logarithm of the number by the index of the power, or dividing it by the index of the root, and taking that number in the table whose logarithm is the product or quotient for the power or root required.

If in the equation $a=r^{A}$ where a is any number, A its logarithm, and r the base of the system) we suppose $a=1$, then, in this case $r^{A}=1$; but this equation can only be satisfied by putting $A=0$. Hence it appears, *that in every system of logarithms, the logarithm of unity must be* 0. If on the other hand we assume $a=r$; then we have the equation $r=r^{A}$, which is immediately satisfied by putting $A=1$; therefore, *the logarithm of the base, or radical number of every system, is necessarily unity.*

If we suppose r to be a positive number greater than unity, and a a positive number greater than unity, then A will be a positive number; for if it be negative we would have $a\left(=r^{-A}=\frac{1}{r^{A}}\right)$ a proper fraction, and at the same time a number greater than unity by hypothesis, which is impossible. If on the contrary we suppose a a proper fraction, then A must necessarily be negative, for if it were positive, then r^{A} would be greater than unity, and $a(=r^{A})$ also greater than unity, while by hypothesis it is a fraction less than unity, which is impossible. *Therefore, in every system, the base of which is greater than unity, the logarithm of a whole or mixt number is always positive, but the logarithm of a proper fraction is always negative.*

Because the logarithm of r is unity, the logarithm of r^{n} will be n; therefore, *the logarithm of any integer power of the radical number r will always be an integer.*

Let r and r' denote bases of two different systems; and let A be the logarithm of a number, a, taken according to the first of these, and A′ its logarithm taken according to the last. Then because $a=r^{A'}$, and $a=r'^{A'}$, it follows that $r^{A}=r'^{A'}$, and $r=r'^{\frac{A'}{A}}$. Let us now suppose that r'' is the base of a third system of logarithms, and R and R′ the logarithms of r and r' taken according to this third system; then because

$$r''^{R}=r, \qquad r''^{R'}=r';$$

we have $r''^{RR'}=r^{R'}$, $r''^{RR'}=r'^{R}$;

therefore $r^{R'}=r'^{R}$, and $r=r'^{\frac{R}{R'}}$; but we have already found $r=r^{\frac{A'}{A}}$, therefore $r'^{\frac{A}{A'}}=r'^{\frac{R}{R'}}$, and consequently

$$\frac{A'}{A}=\frac{R}{R'}, \text{ and } A : A' :: R' : R :: \frac{1}{R}=\frac{1}{R'}.$$

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Hence it appears, *that the logarithm of a number, taken according to one system, has to its logarithm, taken according to any other system, a constant ratio, which is the same as that of the reciprocals of the logarithms of the radical numbers of those systems, taken according to any system whatever.*

Let us next suppose, that a and b are two numbers, and A and B their logarithms, taken according to the same system, and r the base of the system; then because

$$r^{A}=a, \qquad r^{B}=b;$$

we have $r^{AB}=a^{B}$, $r^{AB}=b^{A}$;

therefore $a^{B}=b^{A}$, and $a=b^{\frac{A}{B}}$. Now as r is not found in this equation, the value of the fraction $\frac{A}{B}$ depends only on the numbers a and b; therefore, *the logarithms of any two given numbers have the same ratio in every system whatever.*

Having now explained the properties which belong to the logarithms of any system whatever, we proceed to investigate general rules by which the number corresponding to any logarithm, and, on the contrary, the logarithm corresponding to any number, may be found the one from the other. And for this end let us denote any number whatever by y, and its logarithm by x, and put r as before for the base, or radical number of the system; then by the nature of logarithms we have this equation

$$y=r^{x}.$$

Put $r=1+a$, and let the expression $(1+a)^{x}$ be expanded into a series by the binomial theorem; thus we shall have $y=$

$$1+x\,a+\frac{x(x-1)}{1\cdot 2}a^{2}+\frac{x(x-1)(x-2)}{1\cdot 2\cdot 3}a^{3}+\frac{x(x-1)(x-2)(x-3)}{1\cdot 2\cdot 3\cdot 4}a^{4}+\text{ \&c.}$$

Let this series, the terms of which are arranged according to the powers of the quantity a, be transformed into another, the terms of which shall be arranged according to the powers of x; and to effect this we must find the actual products of the factors which constitute the powers of a, and arrange the terms anew, as follows,

$$1=1,$$

$$x\,a=+a\,x,$$

$$\frac{x(x-1)}{1\cdot 2}a^{2}=-\frac{a^{2}}{2}x+\frac{a^{2}}{2}x^{2},$$

$$\frac{x(x-1)(x-2)}{1\cdot 2\cdot 3}a^{3}=+\frac{a^{3}}{3}x-\frac{a^{3}}{2}x^{2}+\frac{a^{3}}{6}x^{3},$$

$$\frac{x(x-1)(x-2)(x-3)}{1\cdot 2\cdot 3\cdot 4}=-\frac{a^{4}}{4}x+\frac{11\,a^{4}}{24}x^{2}-\frac{a^{4}}{4}x^{3}+\frac{a^{4}}{24}x^{4},$$

&c. &c.

so that adding into one sum the quantities on each side of the sign $=$, and recollecting that the sum of these on the left-hand side is equal to y, we have

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$$y=r^x=\begin{cases}1\\ +(a-\frac{a^2}{2}+\frac{a^3}{3}-\frac{a^4}{4}+\&c.)x,\\ +(\frac{a^2}{2}-\frac{a^3}{2}+\frac{11a^4}{24}-\&c.)x^2,\\ +(\frac{a^3}{6}-\frac{a^4}{4}+\&c.)x^3,\\ +(\frac{a^4}{24}-\&c.)x^4,\\ +\&c.\end{cases}$$

which equation, by substituting

$$A \text{ for } a-\frac{a^2}{2}+\frac{a^3}{3}-\frac{a^4}{4}+\&c.$$
$$A' \text{ for } \frac{a^2}{2}-\frac{a^3}{2}+\frac{11a^4}{4}-\&c.$$
$$A'' \text{ for } \frac{a^3}{6}-\frac{a^4}{4}+\&c.$$
$$A''' \text{ for } \frac{a^4}{24}-\&c.$$
$$\&c.$$

may be abbreviated to

$$r^x=1+Ax+A'x^2+A''x^3+A'''x^4+\&c.$$

Next, to determine the law of connexion of the quantities A, A', A'', A''', &c. let $x+z$ be substituted in the last equation for x, (here z is put for any indefinite quantity) thus it becomes

$$r^{x+z}=1+A(x+z)+A'(x+z)^2+A''(x+z)^3+\&c.$$

But $r^{x+z}=r^x\times r^z$, and since it has been shewn that

$$r^x=1+Ax+A'x^2+A''x^3+A'''x^4+\&c.$$

for the very same reason

$$r^z=1+Az+A'z^2+A''z^3+A'''z^4+\&c.$$

therefore the series

$$1+A(x+z)+A'(x+z)^2+A''(x+z)^3+A'''(x+z)^4+\&c.$$

is equal to the product of the two series

$$1+Ax+A'x^2+A''x^3+A'''x^4+\&c.$$
$$1+Az+A'z^2+A''z^3+A'''z^4+\&c.$$

That is, by actual involution and multiplication,

$$\left.\begin{array}{l}1+Ax+A'x^2+A''x^3+A'''x^4+\&c.\\ +Az+2A'xz+3A''x^2z+4A'''x^3z+\&c.\\ +A'z^2+3A''xz^3+6A'''x^2z^2+\&c.\\ +A''z^3+4A'''xz^3+\&c.\\ +A'''z^4+\&c.\end{array}\right\}=$$

$$=\begin{cases}1+Ax+A'x^2+A''x^3+A'''x^4+\&c.\\ +Az+A^2xz+AA'x^2z+AA''x^3z+\&c.\\ +A'z^2+AA'xz^2+A'A'x^3z^3+\&c.\\ +A''z^3+AA''xz^3+\&c.\\ +A'''z^4+\&c.\end{cases}$$

Now as the quantities A, A', A'', &c. are quite independent of x and z, the two sides of the equation can only be identical, upon the supposition that the coefficients of like terms in each are equal; therefore, setting aside the first line of each side of the equation, because their terms are the same, and also the first term of the second line, for the same reason, let the coefficients of the remaining terms be put equal to one another, thus we have

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$$\left.\begin{array}{l}A^2=2A'\\ AA'=3A''\\ AA''=4A'''\\ \&c.\end{array}\right\} \text{ and hence we have } \begin{cases}A'=\frac{A^2}{1\cdot 2}\\ A''=\frac{A^3}{1\cdot 2\cdot 3}\\ A'''=\frac{A^4}{1\cdot 2\cdot 3\cdot 4}\\ \&c.\end{cases}$$

Here the law of the coefficients A, A', A''', &c. is obvious, each being formed from the preceding by multiplying it by A, and dividing by the exponent of the power of A which is thus formed. Let these values of A', A'', &c. be now substituted in the equation

$$y=r^x=1+Ax+A'x^2+A''x^3+\&c.$$

and it becomes,

$$y=1+Ax+\frac{A^2}{1\cdot 2}x^2+\frac{A^3}{1\cdot 2\cdot 3}x^3+\frac{A^4}{1\cdot 2\cdot 3\cdot 4}x^4+\&c.$$

thus we have obtained a general formula expressing a number in terms of its logarithm and the base of the system, for we must recollect that the quantity A which is equal to

$$a-\frac{a^2}{2}+\frac{a^3}{3}-\frac{a^4}{4}+\frac{a^5}{5}-\&c.$$

is otherwise expressed by

$$r-1-\frac{(r-1)^2}{2}+\frac{(r-1)^3}{3}-\frac{(r-1)^4}{4}+\frac{(r-1)^5}{5}-\&c.$$

where r denotes the base of the system (A).

If in the formula

$$r^x=1+Ax+\frac{A^2}{1\cdot 2}x^2+\frac{A^3}{1\cdot 2\cdot 3}x^3+\frac{A^4}{1\cdot 2\cdot 3\cdot 4}x^4+\&c.$$

we suppose $x=1$, it becomes

$$r=1+A+\frac{A^2}{1\cdot 2}+\frac{A^3}{1\cdot 2\cdot 3}+\frac{A^4}{1\cdot 2\cdot 3\cdot 4}+\&c.$$

an equation which contains r only; but as r has been all along supposed an indeterminate quantity, this equation must be identical, that is, if instead of A, its value, as expressed above in terms of r, were substituted, the whole would vanish.

Again, let us suppose that $\frac{1}{A}$ is substituted instead of x in the general formula, thus it becomes

$$r^{\frac{1}{A}}=1+1+\frac{1}{1\cdot 2}+\frac{1}{1\cdot 2\cdot 3}+\frac{1}{1\cdot 2\cdot 3\cdot 4}+\&c.$$

 Thus

(A) For other analytic methods of investigating the same formula, see Algebra, § 293, and Fluxions, § 54 and § 70. Ex. 1. also § 200. Prob. 1.

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Thus the quantity $r^{\frac{1}{A}}$, whatever be the value of r, is evidently equal to a constant number, which, as appears from the last equation, is equal to the value of r when $A=1$. By adding together a sufficient number of the terms of the series expressing the value of $r^{\frac{1}{A}}$, we find that quantity equal to

$$2.7182818284590 45\ldots$$

Let this number be denoted by e, and we have $r^{\frac{1}{A}}=e$, and $r=e^A$; hence it appears, that if the number e be considered as the base of a logarithmic system, the quantity A, that is

$$r-1-\frac{(r-1)^2}{2}+\frac{(r-1)^3}{3}-\frac{(r-1)^4}{4}+\frac{(r-1)^5}{5}-\&c.$$

is the logarithm of r to the base e. But as r is not restricted here to any particular value, we may substitute y instead of it, keeping in mind that y denotes any number whatever, and x its logarithm; thus we have x the logarithm of y, expressed by the series

$$y-1-\frac{(y-1)^2}{2}+\frac{(y-1)^3}{3}-\frac{(y-1)^4}{4}-\frac{(y-1)^5}{5}-\&c.$$

supposing that the base of the system is the number we have expressed above by e.

We have now found a general formula for the logarithm of any number, y, taken according to a particular system, namely, that which has the number e for its base. But it is easy from hence to find a formula, which shall apply to any system whatever. For it has been shewn that the logarithms of the same number, taken according to two different systems, are to each other as the reciprocals of the logarithms of the bases of the systems, these last logarithms being taken according to any system whatever, that is,

$$\text{log. } y \text{ to base } e : \text{log. } y \text{ to base } r :: \frac{1}{\text{log. } e} : \frac{1}{\text{log. } r};$$

hence we find

$$\text{log. } y \text{ to base } r=\frac{\text{log. } e}{\text{log. } r}\times\text{log. } y \text{ to base } e.$$

Let the value we have already found for the logarithm of y to base e be substituted in this equation, and it becomes

$$\text{log. } y=x=\frac{\text{log. } e}{\text{log. } r}\left\{y-1-\frac{(y-1)^2}{2}+\frac{(y-1)^3}{3}-\frac{(y-1)^4}{4}+\&c.\right\}$$

which is a general formula for the logarithm of *any number whatever*, to the base r. And it is to be recollected that in the fraction $\frac{\text{log. } e}{\text{log. } r}$, which is a common multiplier to the series, the logarithms are to be taken according to the same base, which however may be any number whatever (B).

If in the above formula we suppose $r=e$, the multiplier $\frac{\text{log. } e}{\text{log. } r}$ will be unity, and the formula will become simply

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$$\text{log. } y=y-1-\frac{(y-1)^2}{2}+\frac{(y-1)^3}{3}-\frac{(y-1)^4}{4}+\&c.$$

as we have already remarked. Now this is the system which was adopted by *Lord Napier*; and although the logarithms which were computed according to this system, or upon the supposition that the radical number is 2.7182818, &c. have been called *hyperbolic logarithms*, because they happen to be proportional to certain hyperbolic spaces, yet, as the logarithms of every system have the same property, it is more proper to call them *Napierean logarithms*.

As the constant multiplier $\frac{\text{log. } e}{\text{log. } r}$, which occurs in the general formula for the logarithm of any number, is the only part of the formula which depends for its value upon the base of the system, it has been called by writers on logarithms, the *modulus* of the system. If we suppose the logarithms taken to the base e, then the numerator, viz. log. e, will be unity, and the denominator will be the Napierean logarithm of r. If however we suppose the logarithms taken to the base r, then the numerator will be log. e to base r; and the denominator will be unity, so that the *modulus* of any system whose base is r, is *the reciprocal of the Napierean logarithm of that base*; or it is *the logarithm of the number e* (the base of the Napierean system) *to the base r*.

In the Napierean system the *modulus* is unity, and hence the logarithms of this system, as far as depends upon facility of computation, are the most simple of any. It was, however, soon found that a system whose base should be the same as the root of the scale of the arithmetical notation, viz. the number 10, would be the most convenient of any in practice; and accordingly such a system was actually constructed by Mr *Briggs*. This is the only one now in common use, and is called *Briggs's system*, also *the common system* of logarithms. The *modulus* of this system therefore is the reciprocal of the Napierean logarithm of 10; or it is the common logarithm of $e=2.7182818$, &c. the base of the Napierean system. We shall in future denote this *modulus* by M; so that the formula expressing the common logarithm of any number y will be

$$\text{log. } y=M\left\{y-1-\frac{(y-1)^2}{2}+\frac{(y-1)^3}{3}-\frac{(y-1)^4}{4}+\&c.\right\}$$

If the number y, whose logarithm is required be very near to unity, so that $1-y$ is a small quantity, then the logarithm may be found from this formula with great ease, because the series will converge very rapidly. If, however, $1-y$ be greater than unity, the series, instead of converging, will diverge, so as to be in its present form of no use.

It may however be transformed into another, which shall converge in every case, by substituting in it $\sqrt[n]{y}$ instead of y, and observing that log. $(\sqrt[n]{y})=\frac{\text{log. } y}{n}$; it

(B) For other methods of investigating the same formula see ALGEBRA, 284, and FLUXIONS, § 70. Ex. 2. also § 136.

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it thus becomes

$$\log. y = nM\left\{ \sqrt[n]{y} - 1 - \tfrac{1}{2}(\sqrt[n]{y} - 1)^2 + \tfrac{1}{3}(\sqrt[n]{y} - 1)^3 - \&c. \right\}$$

where n may denote any number whatever, positive or negative. But whatever be the number y, we can always take n, such, that $\sqrt[n]{y}$ shall be as nearly equal to 1, as we please, therefore by this last formula, we can always find the logarithm of y to any degree of accuracy whatever.

If we suppose n to be taken negative, then $\sqrt[n]{y} = \frac{1}{\sqrt[n]{y}}$, and the series which expresses log. y becomes, by changing the signs.

$$\log. y = nM\left\{ 1 - \frac{1}{\sqrt[n]{y}} + \tfrac{1}{2}\left(1 - \frac{1}{\sqrt[n]{y}}\right) + \tfrac{1}{3}\left(1 - \frac{1}{\sqrt[n]{y}}\right)^3 + \&c \right\}$$

where all the terms are positive. Thus we have it in our power to express the value of y, either by a series which shall have its terms all positive, or by one which shall have its terms alternately positive and negative: for it is evident that y being greater than unity, $\sqrt[n]{y}$ will also be greater than unity, and y being less than unity, $\sqrt[n]{y}$ will also be less than unity, but the differences will be so much the smaller as n the exponent of the root is greater; therefore $\sqrt[n]{y} - 1$ will be positive in the first case, and negative in the second.

Because $M = \frac{1}{\text{Nap. log. } 10}$, therefore Nap. log. 10 $= \frac{1}{M}$; hence by the two last formulas we have

$$\frac{1}{M} = n\left\{ \sqrt[n]{10} - 1 - \tfrac{1}{2}(\sqrt[n]{10} - 1)^2 + \tfrac{1}{3}(\sqrt[n]{10} - 1)^3 - \&c \right\}$$

also

$$\frac{1}{M} = n\left\{ 1 - \frac{1}{\sqrt[n]{10}} + \tfrac{1}{2}\left(1 - \frac{1}{\sqrt[n]{10}}\right)^2 + \tfrac{1}{3}\left(1 - \frac{1}{\sqrt[n]{10}}\right)^3 + \&c \right\}$$

It is evident that by giving to $\sqrt[n]{y}$ such a value that $\sqrt[n]{y} - 1$ is a fraction less than unity, we render both the series for the value of log. y converging; for as $\sqrt[n]{y} - 1$ is a fraction less than unity, the expression $1 - \frac{1}{\sqrt[n]{y}}$ will also be less than unity, seeing that it is equal to $\frac{\sqrt[n]{y} - 1}{\sqrt[n]{y}}$. Therefore, in the first series, the second and third terms (taken together as one term) constitute a negative quantity, and as the same is also true of the fourth and fifth, and so on; the amount of all the terms after the first is a negative quantity, that is, a quantity which is to be subtracted from the first, that we may have the value of log. y. Hence we may infer that

$$\log. y < nM(\sqrt[n]{y} - 1).$$

And since, on the contrary, the terms of the second series are all positive, the amount of all the terms after the first is a positive quantity, that is, a quantity which must be added to the first to give the value of log. y; so that we have

$$\log. y > nM\left(1 - \frac{1}{\sqrt[n]{y}}\right).$$

Thus we have two limits to the value of the logarithm of y, which, by taking the number n sufficiently great, may come as near to each other as we please. Nature of Logarithms, &c.

In like manner we find two limits to the value of the reciprocal to the modulus, viz.

$$\frac{1}{M} < n(\sqrt[n]{10} - 1, \quad \frac{1}{M} > n\left(1 - \frac{1}{\sqrt[n]{10}}\right).$$

It is evident that the difference between the two limits of log. y, is

$$nM\left\{ (\sqrt[n]{y} - 1) - \left(1 - \frac{1}{\sqrt[n]{y}}\right) \right\},$$

therefore if we take either the one or the other of the two preceding expressions for log. y, the error in excess or defect is necessarily less than this quantity.

By these formulas we may depend upon having the logarithm of any number true to m figures, if we give to n such a value that the root $\sqrt[n]{y}$ shall have m cyphers between the decimal point and the first significant figure on the right. So that in general, as the error is the smaller according as n the exponent of the root is greater, we may conclude that it becomes nothing, or may be reckoned as nothing, when n is taken indefinitely great; and this being the case, we may conclude that either of these expressions.

$$nM(\sqrt[n]{y} - 1), \quad nM\left(1 - \frac{1}{\sqrt[n]{y}}\right)$$

is the accurate value of log. y.

The best manner of applying the preceding formula is to take some power of the number 2 for n; for by doing so, the root $\sqrt[n]{y}$ may be found by a repetition of extractions of the square root only. It was in this way that Briggs calculated the first logarithms; and he remarked, that if in performing the successive extractions of the square root, he at last obtained twice as many decimal places as there were cyphers after the decimal point, the integer before it being unity, then the decimal part of this root was exactly the half of that which went before; so that the decimal parts of the two roots were to each in the same proportion as their logarithms: now this is an evident consequence of the preceding formula.

To give an example of the application of the formula, let it be required to find the numerical value of M, the modulus of the common system of logarithms, which, as it is the reciprocal of the Napierean logarithm of 10, is equal to

$$\frac{1}{n} \times \frac{1}{\sqrt[n]{10} - 1} \text{ nearly,}$$

when n is some very great number. Let us suppose $n = 2^{60} = 8^{20}$; then, dividing unity by 8, and this result again by 8, and so on, we shall, after 20 divisions, have $\frac{1}{n}$, or $\frac{1}{8^{20}}$ equal to

0.00000 00000 00000 00086 73617 37988 40354.

Also, by extracting the square root of 10, and the square root of this result, and so on, after performing 60 extractions we shall find $\sqrt[n]{10}$ equal to

1.00000 00000 00000 00019 97174 20812 55052 70325 1.

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Therefore, $\frac{1}{n} \times \frac{1}{\sqrt[n]{10}-1}$, or M, is equal to

$$\frac{8673617379884035 4}{1997174208125505 27} = 0.4342944819.$$

As a second example, let it be required to find by the same formula the logarithm of the number 3, which is nearly equal to

$$n\,M\,(\sqrt[n]{3}-1) = \frac{n(\sqrt[n]{3}-1)}{n(\sqrt[n]{10}-1)} = \frac{\sqrt[n]{3}-1}{\sqrt[n]{10}-1},$$

n being as before a very great number. Let us suppose also in this case that $n = 2^{60}$; then after 60 extractions of the square root we have $\sqrt[n]{3}$ equal to

1.00000 00000 00000 0095 28942 64074 58932.

Therefore, taking the value of $\sqrt[n]{10}$ as found in last example, we have

$$\log. 3 = \frac{\sqrt[n]{3}-1}{\sqrt{10}-1} = \frac{9528942640745 8932}{1997174208125505 27}$$
$$= .4\ 7712\ 11547\ 19662.$$

This method of computing logarithms is evidently attended with great labour, on account of the number of extractions of roots which it requires, to obtain a result true to a moderate number of places of figures. But the two series, which we have given, serve to simplify and complete it. For whatever be the number y, it is only necessary to proceed with the extractions of the square root, till we have obtained for $\sqrt[n]{y}$ a value which is unity followed by a decimal fraction; and then $\sqrt[n]{y}-1$, being a fraction, its powers will also be fractions, which will be so much the smaller as their exponents are greater; thus a certain number of terms of the series will serve to express the logarithm to as many decimal places as may be required.

There are yet other analytical artifices by which the series

$$\log. y = M\left\{y-1-\tfrac{1}{2}(y-1)^2+\tfrac{1}{3}(y-1)^3-\tfrac{1}{4}(y-1)^4+\&c.\right\}$$

may be transformed into others which shall always converge, and in particular the following. Let $1+u$ be substituted in the series for y; then it becomes

$$\log. (1+u) = M\left(u-\frac{u^2}{2}+\frac{u^3}{3}-\frac{u^4}{4}+\frac{u^5}{5}-,\&c.\right)$$

In like manner let $1-u$ be substituted for y, and we have

$$\log. (1-u) = M\left(-u-\frac{u^2}{2}-\frac{u^3}{3}-\frac{u^4}{4}-\frac{u^5}{5}-,\&c.\right).$$

Let each side of the latter equation be subtracted from the corresponding side of the former; the result on the left-hand side will be log. $(1+u)$ — log. $(1-u)$, which, by the nature of logarithms, is equal to log. $\frac{1+u}{1-u}$; and on the right-hand side the alternate terms of the two series, having the same sign, these will by subtraction destroy each other, so that we shall have

$$\log. \frac{1+u}{1-u} = 2M\left\{u+\frac{u^3}{3}+\frac{u^5}{5}+\frac{u^7}{7}+,\&c.\right\}$$

which series, by substituting z for $\frac{1+u}{1-u}$, and consequently, $\frac{z-1}{z+1}$ for u, will be otherwise expressed thus,

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$$\log. z = 2M\left\{\frac{z-1}{z+1}+\tfrac{1}{3}\left(\frac{z-1}{z+1}\right)^3+\tfrac{1}{5}\left(\frac{z-1}{z+1}\right)^5+\&c.\right\};$$

and this formula for the logarithm of a number is not only simple, but has also the property of converging in every possible case.

That we may give an example of the utility of this formula, we shall employ it in the calculation of the Napierean logarithm of 2, which by the above formula will be

$$2\left(\frac{1}{3}+\frac{1}{3\cdot 3^3}+\frac{1}{5\cdot 3^5}+\frac{1}{7\cdot 3^7}+\frac{1}{9\cdot 3^9}+\&c.\right)$$
$$= A+\tfrac{1}{3}B+\tfrac{1}{5}C+\tfrac{1}{7}D+\tfrac{1}{9}E+\&c.$$

where A is put for $\frac{2}{3}$, B for $\frac{2}{3^3}=\frac{A}{9}$, C for $\frac{2}{3^5}=\frac{B}{9}$, D for $\frac{2}{3^7}=\frac{C}{9}$, &c. The calculation will be as follows.

A=	.666666666666
B= $\frac{1}{9}$ A=	.074074074074
C= $\frac{1}{9}$ B=	.008230452674
D= $\frac{1}{9}$ C=	.000914494742
E= $\frac{1}{9}$ D=	.000101610527
F= $\frac{1}{9}$ E=	.000011290059
G= $\frac{1}{9}$ F=	.000001254451
H= $\frac{1}{9}$ G=	.000000139383
I= $\frac{1}{9}$ H=	.000000015487
K= $\frac{1}{9}$ I=	.000000001721
L= $\frac{1}{9}$ K=	.000000000191
M= $\frac{1}{9}$ L=	.000000000021

A=	.666666666666
$\frac{1}{3}$ B=	.024691358025
$\frac{1}{5}$ C=	.001646090535
$\frac{1}{7}$ D=	.000130642106
$\frac{1}{9}$ E=	.000011290056
$\frac{1}{11}$ F=	.000001026369
$\frac{1}{13}$ G=	.000000096496
$\frac{1}{15}$ H=	.000000009292
$\frac{1}{17}$ K=	.000000000911
$\frac{1}{19}$ L=	.000000000091
$\frac{1}{21}$ M=	.000000000001
Nap. log. 2 =	.693147180551

Thus, by a very easy calculation, we have obtained the Napierean logarithm of 2 true to the first ten places of figures; the accurate value, as far as the 12th place, being 0.693147180550.

If this very simple process by which we have found the logarithm of 2 (the whole of which is here actually put down), be compared with the laborious calculations which must have been performed to have found the same logarithm by the method explained in the beginning of this section, the great superiority of this method to the other, and even to the second method, by which we have found the numerical value of M, and the common logarithm of 3, must be very apparent.

In the same manner as we have found the logarithm of 2 we may find those of 3, 5, &c. In computing the logarithm

logarithm of 3 the series would converge by the powers of the fraction $\frac{3-1}{3+1}=\frac{1}{2}$, and in computing the logarithm of 5 it would converge by the powers of $\frac{5-1}{5+1}=\frac{2}{3}$; but in each of these cases the series would converge slower, and of course the labour would be greater than in computing the logarithm of 2. And if the number whose logarithm was required was still more considerable; as for example 199, the series would converge so slow as to be useless.

We may however avoid this inconvenience by again transforming this last formula into another which shall express the logarithm of any number by means of a series, and a logarithm supposed to be previously known. To effect this new transformation, let $\frac{1+u}{1-u}=1+\frac{z}{n}$, then, by resolving this equation in respect of u, we have $u=\frac{z}{2n+z}$. Let these values of $\frac{1+u}{1-u}$ and u be substituted in the formula,

$$\log.\frac{1+u}{1-u}=2\,M\left(u+\frac{u^3}{3}+\frac{u^5}{5}+\frac{u^7}{7}+\&c.\right)$$

and we have $\log.\left(1+\frac{z}{n}\right)$ equal to

$$2\,M\left\{\frac{z}{2n+z}+\tfrac{1}{3}\left(\frac{z}{2n+z}\right)^3+\tfrac{1}{5}\left(\frac{z}{2n+z}\right)^5+\&c.\right\}$$

but $\log.\left(1+\frac{z}{n}\right)=\log.\frac{n+z}{n}=\log.(n+z)-\log.n$,

therefore, by substituting this value of $\log.\frac{n+z}{n}$, and transposing $\log.n$ to the other side of the equation, we have

$$\log.(n+z)=\log.n+$$
$$2M\left\{\frac{z}{2n+z}+\tfrac{1}{3}\left(\frac{z}{2n+z}\right)^3+\tfrac{1}{5}\left(\frac{z}{2n+z}\right)^5+\&c.\right\}$$

By the assistance of this formula, and the known properties of logarithms, we may proceed calculating the logarithm of one number from that of another as follows.

To find the Napierean logarithm of 3 from that of 2, which has been already found. We have here $n=2$, $z=1$, and $\frac{z}{2n+z}=\frac{1}{5}$. Therefore the logarithm required is equal to

$$\log.2+2\left(\frac{1}{5}+\frac{1}{3\cdot5^3}+\frac{1}{5\cdot5^5}+\frac{1}{7\cdot5^7}+\&c.\right)$$
$$=\log.2+A+\tfrac{1}{3}B+\tfrac{1}{5}C+\tfrac{1}{7}D+\tfrac{1}{9}E+\&c.$$

where A is put for $\frac{1}{5}$, B for $\frac{A}{25}$, C for $\frac{B}{25}$, and so on.

The calculation may stand thus:

$$\begin{aligned}
A &=.400000000000\\
B=\tfrac{1}{25}A&=.016000000000\\
C=\tfrac{1}{25}B&=.000640000000\\
D=\tfrac{1}{25}C&=.000025600000\\
E=\tfrac{1}{25}D&=.000001024000\\
F=\tfrac{1}{25}E&=.000000040960\\
G=\tfrac{1}{25}F&=.000000001638\\
H=\tfrac{1}{25}G&=.000000000066
\end{aligned}$$

$$\begin{aligned}
A&=.400000000000\\
\tfrac{1}{3}B&=.005333333333\\
\tfrac{1}{5}C&=.000128000000\\
\tfrac{1}{7}D&=.000003657143\\
\tfrac{1}{9}E&=.000000113778\\
\tfrac{1}{11}F&=.000000003724\\
\tfrac{1}{13}G&=.000000000125\\
\tfrac{1}{15}H&=.000000000004
\end{aligned}$$

$$.405465108108$$
$$\text{Nap. log. } 2.=.693147180551$$
$$\text{Nap. log. } 3.=1.098612288659$$

This logarithm is true to 10 decimal places, the accurate value to 12 figures being 1.098612288668.

To find the Napierean logarithm of 4. This is immediately had from that of 2 by considering that as $4=2^2$, therefore log. 4=log. 2+ log. 2.

$$\text{Nap. log. } 2=.693147180551$$
$$2$$
$$\text{Nap. log. } 4=1.386294361102$$

This logarithm is also true to 10 places besides the integer.

To find the Napierean logarithm of 5, from that of 4; we have $n=4$, $z=1$, and $\frac{z}{2n+1}=\frac{1}{9}$, therefore the logarithm of 5 is expressed by

$$\log.4+2\left(\frac{1}{9}+\frac{1}{3\cdot9^3}+\frac{1}{5\cdot9^5}+\frac{1}{7\cdot9^7}+\&c.\right)$$
$$\log.4+A+\tfrac{1}{3}B+\tfrac{1}{5}C+\tfrac{1}{7}D+\&c.$$

where $A=\frac{2}{9}$, $B=\frac{1}{81}A$, $C=\frac{1}{81}B$, &c.

The calculation.

$$\begin{aligned}
A&=.222222222222\\
B=\tfrac{1}{81}A&=.002743484225\\
C=\tfrac{1}{81}B&=.000033870176\\
D=\tfrac{1}{81}C&=.000000418150\\
E=\tfrac{1}{81}D&=.000000005162\\
F=\tfrac{1}{81}E&=.000000000064
\end{aligned}$$

$$\begin{aligned}
A&=.222222222222\\
\tfrac{1}{3}B&=.000914494742\\
\tfrac{1}{5}C&=.000006774035\\
\tfrac{1}{7}D&=.000000059736\\
\tfrac{1}{9}E&=.000000000574\\
\tfrac{1}{11}F&=.000000000006
\end{aligned}$$

$$.223143551315$$
$$\text{Nap. log. } 4=1.386294361102$$
$$\text{Nap. log. } 5=1.609437912417$$

This result is also correct to the first ten places of decimals.

The

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The logarithm of 6 is found from those of 2 and 3 by considering, that because $6 = 2 \times 3$, therefore log. 6 = log. 2 + log. 3.

Nap. log. 2 = 0.693147180551
Nap. log. 3 = 1.098612288659

Nap. log. 6 = 1.791759469210

This result is correct as far as the tenth decimal place.

We might find the logarithm of 7 from the logarithm of 6, that is, from the logarithm of 3 and 2, in the same manner as we have found the logarithms of 5 and 3; but it may be more readily found from the logarithms of 2 and 5 by reasoning thus. Because $\frac{2 \times 5^2}{7^2} = \frac{50}{49}$, therefore log. 2 + 2 log. 5 − 2 log. 7 = log. $\frac{50}{49}$, and consequently

$$\log. 7 = \tfrac{1}{2} \log. 2 + \log. 5 - \tfrac{1}{2} \log. \frac{50}{49}$$

Now the logarithm of $\frac{50}{49}$ may be readily obtained from the formula

$$\log. z = 2M \left\{ \frac{z-1}{z+1} + \tfrac{1}{3}\left(\frac{z-1}{z+1}\right)^3 + \tfrac{1}{5}\left(\frac{z-1}{z+1}\right)^5 + \&c. \right\}$$

For substituting $\frac{50}{49}$ for z, the formula gives

$$\text{Nap. log. } \frac{50}{49} = 2\left(\frac{1}{99} + \frac{1}{3 \cdot 99^3} + \frac{1}{5 \cdot 99^3} + \&c.\right)$$

$$= A + \tfrac{1}{3}B + \tfrac{1}{5}C + \&c.$$

where $A = \frac{2}{9.11}$, $B = \frac{A}{9^2.11^2}$, $C = \frac{B}{9^2.11^2}$, &c. This series converges with great rapidity, and a few of its terms will be sufficient to give the logarithm of 7, as appears from the following operation.

$$A = .020202020202$$
$$B = \frac{1}{9^2.11^2} A = .000002061220$$
$$C = \frac{1}{9^2.11^2} B = .000000000210$$

$$A = .020202020202$$
$$\tfrac{1}{3}B = .000000687073$$
$$\tfrac{1}{5}C = .000000000042$$

Nap. log. $\frac{50}{49}$ = .020202707317

$\frac{1}{2}$ log. 2 = 0.346573590275
log. 5 = 1.609437912417

1.956011502692

$\frac{1}{2}$ log. $\frac{50}{49}$ = 0.010101353658

Nap. log. 7 = 1.945910149034

This logarithm, like those we found before, is correct in the first ten decimal places.

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The logarithms of 8, 9, and 10 are immediately obtained from those of 2, 3, and 5, as follows:

Nap. log. 2 = 0.693147180551
× 3

Nap. log. 8 = 2.079441541653

Nap. log. 3 = 1.098612288659
× 2

Nap. log. 9 = 2.197224577318

Nap. log. 2 = 0.693147180551
Nap. log. 5 = 1.609437912417

Nap. log. 10 = 2.302585092968

Thus by a few calculations we have found the Napierean logarithms of the first ten numbers, each true to ten decimal places; and since the Napierean logarithm of 10 is now known, the *modulus* of the common system, which is the reciprocal of that logarithm, will also be known, and will be

$$\frac{1}{2.302585092968} = .4342944819$$

The common logarithms of the first ten numbers may now be found from the Napierean logarithms by multiplying each of the latter by the *modulus*, or dividing by its reciprocal, that is, by the Napierean logarithm of 10. And as the *modulus* of the common system is so important an element in the theory of logarithms, we shall give its value, together with that of its reciprocal, as far as the 30th decimal place.

M = .434294481903251827651128918917

$$\frac{1}{M} = 2.302585092994045684017991454684$$

The formulas we have already given are sufficient for finding the logarithms of all numbers whatever throughout the table; but there are yet others which may often be applied with great advantage, and we shall now investigate some of these.

Because

$$\log. z = 2M \left\{ \frac{z-1}{z+1} + \tfrac{1}{3}\left(\frac{z-1}{z+1}\right)^3 + \tfrac{1}{5}\left(\frac{z-1}{z+1}\right) \&c. \right\}$$

If we now suppose

$$z = \frac{n^2}{n^2-1} = \frac{n^2}{(n-1)(n+1)}$$

so that $\frac{z-1}{z+1} = \frac{1}{2n^2-1}$, then the formula becomes

$$\log. \frac{n^2}{(n-1)(n+1)} = 2M \left\{ \frac{1}{2n^2-1} + \right.$$
$$\left. \tfrac{1}{3}\left(\frac{1}{2n^2-1}\right)^3 + \tfrac{1}{5}\left(\frac{1}{(2n^2-1}\right)^5 + \&c. \right\}$$

But

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But $\log. \frac{n^2}{(n-1)(n+1)} = 2 \log. n - \log. (n-1) - \log. (n+1)$, therefore, putting N for the series

$$2M\left\{\frac{1}{2n^2-1}+\frac{1}{3}\left(\frac{1}{2n^2-1}\right)^3+\frac{1}{5}\left(\frac{1}{2n^2-1}\right)^5+\&c.\right\}$$

we have this formula,

$$2 \log. n - \log. (n-1) - \log. (n+1) = N;$$

and hence, as often as we have the logarithms of any two of three numbers whose common difference is unity, the logarithm of the remaining number may be found. Example. Having given

the common log. of $9 = 0.95424250943$
the common log. of $10 = 1$;

it is required to find the common logarithm of 11.

Here we have $n = 10$, so that the formula gives in this case $2 \log. 10 - \log. 9 - \log. 11 = N$, and hence we have

$$\log. 11 = 2 \log. 10 - \log. 9 - N,$$

$$\text{where } N = \frac{2M}{199}+\frac{2M}{3.199^3}+\&c.$$

M being .43429448190.

Calculation of N.

$$A = \frac{2M}{199} = .00436476866$$

$$B = \frac{A}{3.199^2} = .00000003674$$

$$.00436480540$$

$$2 \log. 10 = 2.00000000000$$

$$\log. 9 = 0.95424250943$$
$$N = 0.00436480540$$

$$\log. 9 + N = 0.95860731483$$

$$\log. 11 = 1.04139268517$$

Here the series expressed by N converges very fast, so that two of its terms are sufficient to give the logarithm true to 10 places of decimals. But the logarithm of 11 may be expressed by the logarithms of smaller numbers, and a series which converges still more rapidly, by the following artifice, which will apply also to some other numbers. Because the numbers 98, 99, and 100 are the products of numbers, the greatest of which is 11, for $98 = 2 \times 7^2$, $99 = 9 \times 11$, and $100 = 10 \times 10$, it follows that if we have an equation composed of terms which are the logarithms of these three numbers, it may be resolved into another, the terms of which shall be the logarithms of the number 11 and other smaller numbers. Now by the preceding formula, if we put 99 for n, we have

$$2 \log. 99 - \log. 98 - \log. 100 = N,$$

that is, substituting $\log. 9 + \log. 11$ for $\log. 99$, $\log. 2 + 2 \log. 7$ for $\log. 98$, and $2 \log. 10$ for $\log. 100$,

$$2 \log. 9 + 2 \log. 11 - \log. 2 - 2 \log. 7 - 2 \log. 10 = N,$$

and hence by transposition, &c.

$$\log. 11 = \tfrac{1}{2}N + \tfrac{1}{2} \log. 2 + \log. 7 - \log. 9 + \log. 10;$$

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and in this equation

$$N = \frac{2M}{19601}+\frac{1}{3}\frac{2M}{19601^3}+\&c.$$

The first term alone of this series is sufficient to give the logarithm of 11 true to 14 places.

Another formula, by which the logarithm of a number is expressed by the logarithms of other numbers and a series, may be found as follows.

Resuming the formula

$$\log. z = 2M\left\{\frac{z-1}{z+1}+\frac{1}{3}\left(\frac{z-1}{z+1}\right)^3+\frac{1}{5}\left(\frac{z-1}{z+1}\right)^5+\&c.\right\}$$

Let us assume

$$z = \frac{(n-1)^2(n+2)}{(n-2)(n+1)^2} = \frac{n^3-3n+2}{n^3-3n-2}$$

$$\text{then } \frac{z-1}{z+1} = \frac{2}{n^3-3n}.$$

Let these values of z, and $\frac{z-1}{z+1}$, be substituted in the formula, and it becomes

$$\log. \frac{(n-1)^2(n+2)}{(n-2)(n+1)^2} = 2M\left\{\frac{2}{n^3-3n}+\frac{1}{3}\left(\frac{3}{n^3-3n}\right)^3+\&c.\right\}$$

But the quantity on the left-hand side of this equation is manifestly equal to $2 \log. (n-1) + \log. (n+2) - \log. (n-2) - 2 \log. (n+1)$, therefore, putting P for the series,

$$2M\left\{\frac{2}{n^3-3n}+\frac{1}{3}\left(\frac{2}{n^3-3n}\right)^3+\frac{1}{5}\left(\frac{2}{n^3-3n}\right)^5+\&c.\right\}$$

we have this formula,

$$\log. (n+2) + 2 \log. (n-1) - \log. (n-2) - 2 \log. (n+1) = P.$$

By this formula we may find, with great facility, the logarithm of any one of the four numbers $n-2$, $n-1$, $n+1$, $n+2$, having the logarithms of the other three. We may also employ it in the calculation of logarithms, as in the following example. Let the numbers 5, 6, 7, 8, be substituted successively in the formula; then, observing that $\log. 6 = \log. 2 + \log. 3$, and $\log. 8 = 3 \log. 2$, we have these four equations,

$$\log. 7 + 2 \log. 2 - 3 \log. 3 = \frac{2M}{55}+\frac{2M}{3.55^3}+\&c.$$

$$-2 \log. 7 + \log. 2 + 2 \log. 5 = \frac{2M}{99}+\frac{2M}{3.99^3}+\&c.$$

$$4 \log. 3 - 4 \log. 2 - \log. 5 = \frac{2M}{161}+\frac{2M}{3.161^3}+\&c.$$

$$\log. 5 - 5 \log. 3 + 2 \log. 7 = \frac{2M}{244}+\frac{2M}{3.244^3}+\&c.$$

Let $\log. 2$, $\log. 3$, $\log. 5$, and $\log. 7$, be now considered as four unknown quantities, and by resolving those equations in the usual manner (see ALGEBRA, Sect. VII.) the logarithms may be determined.

Resuming once more the formula

$$\log. z = 2M\left\{\frac{z-1}{z+1}+\frac{1}{3}\left(\frac{z-1}{z+1}\right)^3+\&c.\right\}$$

let

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let $\frac{n^3(n+5)\,(n-5)}{(n+3)\,(n-3)\,(n+4)\,(n-4)}$ be substituted in it instead of z, then, by this substitution $\frac{z-1}{z+1}$ will become $\frac{-72}{n^4-25n^2+72}$ the formula will be transformed to

$$\log.\frac{n^3(n+5)\,(n-5)}{(n+3)\,(n-3)\,(n+4)\,(n-4)} = -2M\left\{\frac{72}{n^4-25n^2+72}+\tfrac{1}{3}\left(\frac{72}{n^4-25n^2+72}\right)^3+\&c.\right\}$$

Hence, putting the latter side of this equation equal to Q, we have this formula,

$$\left.\begin{array}{l}2\log.n+\log.(n+5)+\log.(n-5)-\log.(n+3)\\ -\log.(n-3)-\log.(n+4)-\log.(n-4)+Q\end{array}\right\}=0$$

which may be applied to the calculation of logarithms in the same manner as the former.

When it is required to find the logarithm of a high number, as for example 1231, we may proceed as follows:

$$\log.1231=\log.(1230+1)=\log.\left\{1230\left(1+\frac{1}{1230}\right)\right\}$$

$$=\log.1230+\log.\left(1+\frac{1}{1230}\right).$$

Again, $\log.1230=\log.2+\log.5+\log.123$, and

$$\log.123=\log.\left\{120\left(1+\frac{1}{40}\right)\right\}$$

$$=\log.120+\log.\left(1+\frac{1}{40}\right)$$

$\log.120=\log.(2^3\times3\times5)=3\log.2+\log.3+\log.5$

Therefore

$$\log.1231=4\log.2+\log.3+2\log.5+\log.\left(1+\frac{1}{40}\right)+\log.\left(1+\frac{1}{1230}\right)$$

Thus the logarithm of the proposed number is expressed by the logarithms of 2, 3, 5, and the logarithms of $1+\frac{1}{40}$, $1+\frac{1}{1230}$, all of which may be easily found by the formulas already delivered.

Having now explained, at considerable length, the theory of logarithms upon principles purely analytical, such being, as we conceive, the most natural way of reasoning concerning the properties of number, we shall conclude this section by stating briefly the ground upon which it was referred to the principles of geometry by the mathematicians of the 17th century. Let C (fig. 2.) be the centre, and CH, CK the asymptotes of an hyperbola. In either of these let there be taken any number of continual proportionals CA, CB, CD, CE, &c. then if B b, D d, E e, &c. be drawn parallel to the other asymptote, meeting the curve in a, b, d, e, &c. the hyperbolic spaces A a b B, B b d D, D d e E, &c. are equal to one another; also if straight lines be drawn from C to the points a, b, d, e, &c. the hyperbolic sectors a C b, b C d, d C e, &c. shall also be equal (Conic Sections, Part III. prop. 30.). Now, since it appears by this proposition that the segments CA, CB, CD, CE, &c. of the asymptote being taken in continued geometrical progression, the corresponding hyperbolic areas A a b B, A a d D, A a e E, &c. constitute a series of quantities in continued arithmetical progression, it is evident that the two series will have, in respect to each other, the same properties as numbers and their logarithms; so that, if we assume CA any segment of the asymptote as the representative of unity, and suppose CB, CD, CE, &c. to be the representatives of other numbers, the hyperbolic areas, A a b B, A a d D, A a e E will be the geometrical representatives of the logarithms of these numbers; and so also will the hyperbolic sectors C a b, C b d, C d e, &c.

Plate CCXCVI. fig. 2.

Description and use of the Table.

Let CA (the line denoting unity) be the side of a rhombus C A a L inscribed at the vertex of the hyperbola, and let CP $=n\times$ CA (n being put for any number); draw Pp parallel to CL meeting the hyperbola in p, then it may be shewn, by the methods usually employed in reasoning about curvilineal areas, that the area of the rhombus A a LC is to the hyperbolic area A a p P as 1 to the Napierean logarithm of the number n. Therefore if the hyperbola be equilateral, so that AaLc is a square, &c. consequently its area $=1\times1=1$, the Napierean logarithm of n, and the area AaPp may be taken as the mutual representatives of each other. It is this circumstance which induced mathematicians to call these logarithms *hyperbolic*. But with equal propriety might the logarithms of any other system be called hyperbolic, as they may be equally expressed by the area of the equilateral hyperbola, or indeed by the area of any hyperbola whatever, (see Fluxions, § 152. Ex. 5.).

SECT. II.

DESCRIPTION AND USE OF THE TABLE.

THE common system of logarithms is so constructed, that, 0 being the logarithm of unity, or 1, the logarithm of 10 is 1; by which it happens that the logarithm of 100 is 2, that of 1000 is 3, and so on. Also, the logarithm of $\frac{1}{10}$, or .1, is -1, that is, 1 considered as substractive; or, in the language of algebra, *minus* one; and the logarithm of $\frac{1}{100}$ or .01, is -2; and the logarithm of .001 is -3, and so on, as in the following short table.

Numbers.	Logarithms.
. . . . .	. .
.001	-3
.00	-2
.1	-1
1	0
10	1
100	2
1000	3
&c.	&c.

As the terms of the geometrical progression 1, 10, 100, &c. continued backwards as well as forward, are the only numbers whose logarithms are integers; the logarithms of all other numbers whatever must be either fractions or mixt numbers. Accordingly, the logarithms of all numbers, whether integer or mixt, between 1 and 10 are expressed by decimal fractions less than

Deſcription and Uſe of the Table.

than unity. The logarithms of numbers between 10 and 100 are expreſſed by mixt numbers compoſed of unity and a decimal fraction. The logarithms of numbers between 100 and 1000 are expreſſed by mixt numbers compoſed of the number 2 and a decimal fraction, and ſo on. On the other hand, the logarithm of any vulgar or decimal fraction leſs than 1, but greater than $\frac{1}{10}$ or .1, will be ſome negative decimal fraction between 0 and —1; and the logarithm of any fraction between .1 and .01, will be a negative mixed quantity between —1 and —2, and ſo on.

But it muſt be remarked, that any fraction, or mixt number, conſidered as entirely negative, may always be transformed into another mixt number of equal value, that ſhall have its integer part negative, but its fractional part poſitive, by diminiſhing the integer by unity, and increaſing the fractional part by the ſame quantity. Thus let the mixt quantity be $-2\frac{3}{10}$, which may be alſo written thus $-2-\frac{3}{10}$. Let the integer —2 be diminiſhed by 1, and the reſult is $-2-1=-3$. Alſo, let the fraction $-\frac{3}{10}$ be increaſed by 1, and it becomes $-\frac{3}{10}+1=+\frac{7}{10}$; therefore the fraction $-2\frac{3}{10}$ or —2.3, when transformed, is $-3+\frac{7}{10}$, or $-3+.7$, which may be written thus, $\bar{3}.7$; where the negative ſign is placed over the integer to indicate that it is the only part of the expreſſion that is conſidered as negative, the other part, viz. .7, being reckoned poſitive.

Since therefore any fractional or mixt quantity, conſidered as entirely negative, is equivalent to another mixt quantity, the integer part of which only is negative, but the fractional part poſitive, it is evident that inſtead of expreſſing the logarithms of fractions by numbers conſidered as entirely negative, we may expreſs them by numbers having their integer parts negative, and their decimal parts poſitive; and it is uſual ſo to expreſs them. Thus the logarithm of .03, inſtead of being expreſſed by —1.52288, that is, by —1—.52288, is uſually expreſſed by 2.47712, by which is to be underſtood —2+.47712. Again, the logarithm of .7, which, if conſidered as entirely negative, would be —.15490, is otherwiſe $\bar{1}$.84510.

As the logarithms of any ſeries of numbers forming a geometrical progreſſion, the common ratio of which is 10, will exceed each other by the logarithm of 10, that is, by 1, it follows that the logarithms of all numbers denoted by the ſame figures, and differing only in the poſition of the decimal point, will have the decimal part of their logarithms the ſame; but the integers ſtanding before the decimals will be different, and will be poſitive or negative, according as the numbers are whole or fractional, as in theſe examples.

Numbers.	Logarithms.
69150	4.83980
6915	3.83980
691.5	2.83980
69.15	1.83980
6.915	0.83980
.6915	$\bar{1}$.83980
.06915	$\bar{2}$.83980

The integer figure of a logarithm, is called its *index* or *characteriſtic*; and *it is always leſs by one than the number of integer figures which the natural number conſiſts of; or it is equal to the diſtance of the firſt figure from the place of units or firſt place of integers, whether on the left or on the right of it.*

Deſcription and Uſe of the Table.

The table of logarithms given at the end of this article, contains the decimal parts of the logarithms of all numbers from 1 to 10,000; and indeed of all numbers which can be expreſſed by four figures, preceded or followed by any numbers of cyphers, ſuch as the numbers 367500, .002795, &c. The index, however, is not put down; but it is eaſily ſupplied by the rule which has juſt now been given. The table alſo contains the differences of the logarithms of all numbers from 1000 to 10,000, by means of which the logarithm of any number conſiſting of five figures may be eaſily obtained.

1. *To find the logarithm of any number conſiſting of four or any ſmaller number of figures.* Look for the number in the columns titled at the top *Numbers*; and in the ſame line with it, on the right, in the column of logarithms, will be found the decimal part of its logarithm, to which ſupply the decimal point, and its index according to rule delivered above. Thus,

The log. of 9 is found to be	0.95424
of 17	1.23045
of 2.63	0.41996
of 13.42	2.12775
of 6280	3.79796
of 3749	$\bar{3}$.57392
of .6027	$\bar{1}$.78010
of .00234	$\bar{3}$.36922
of 852600	5.93075

2. *To find the logarithm of a number conſiſting of five figures.*

Find the decimal part of the logarithm of the firſt four figures of the number, (that is, find the logarithm of the propoſed number as if the laſt figure were a cypher), by the preceding rule, and find the difference between that logarithm and the next greater, as given in the column of differences (to the right of the column of logarithms). Then ſtate this proportion:

As 10,
To the tabular difference,
So is the laſt, or fifth figure of the number,
To a fourth proportional;

which being added to the former logarithm, and the decimal point and index ſupplied, will be the logarithm ſought.

Example. Required the logarithm of 186.47. The decimal part of the logarithm of the firſt four figures, viz. 1864, is .27045, and the difference oppoſite to it in the column marked D on the top is 23. Therefore we have this proportion:

$$10 : 23 :: 7 : \frac{7\times 23}{10} = 16.1$$

The fourth proportional is 16.1, or, rejecting the decimal part, .16 nearly; therefore,

to log. of 1684	.27045
add	16
the log. of 168.47 is	2.27061

Deſcription and Uſe of the Table

3. *To find the logarithm of a vulgar fraction or mixt number.*

Either reduce the vulgar fraction to a decimal, and find its logarithm as above, or elſe (having reduced the mixt number to an improper fraction) ſubtract the logarithm of the denominator from the logarithm of the numerator, and the remainder will be the logarithm of the fraction ſought.

Ex. 1. To find the logarithm of $\frac{3}{16}$.

From the log. of 3	0.47712
Subtract the log. of 16	1.20412
Rem. log. of $\frac{3}{16}$ or of .1875	$\bar{1}$.27300

Here, as the lower number is greater than the upper, the remainder muſt be negative; the ſubtraction, however, is ſo performed, that the decimal part of the remainder is poſitive, and the integer negative.

Ex. 2. To find the logarithm of $13\frac{3}{4}$ or $\frac{55}{4}$.

From log. of 55	1.74036
Subtract log. of 4	0.60206
Rem. log. of $13\frac{3}{4}$ or of 13.75	1.13830

4. *To find the number correſponding to any given logarithm.*

Seek the decimal part of the propoſed logarithm in the column of logarithms, and if it be found exactly, the figures of the number correſponding to it will be found in the ſame line with it in the column of numbers. If the index of the given logarithm is 3, the four figures of the numbers thus found are integers; but if it be 2, the three firſt figures are integers, and the fourth is a decimal, and ſo on; the number of integer figures before the decimal point being always one greater than the index, if it be poſitive; but if it be negative, the number ſought will be a decimal, and the number of cyphers between the decimal point and firſt ſignificant figure will be one leſs than the index.—*Examples.* The number correſponding to the logarithm 3.57392 is 3749. The number correſponding to $\bar{1}$.12775 is 13.42. The number correſponding to $\bar{3}$.36922 is .00234, and ſo on.

But if the given logarithm is not exactly found in the table, ſubtract the next leſs tabular logarithm from it, and take the difference between that logarithm, and the next greater (as given in the column of differences). Then ſtate this proportion:

As the difference, taken from the table,
Is to 10,
So is the difference betwcen the given logarithm and the next leſs,
To a fourth proportional,

which being annexed to the four figures correſponding to the logarithm next leſs than the given one, will be the logarithm required.

Example. Find the number anſwering to the logarithm 4.13278.

The dec. part of given log. is	.13278
That of next leſs, viz. log. of 1357, is	.13258
Difference	20

Deſcription and Uſe of the Table.

The tabular difference is 32, therefore we have this proportion,

$$32 : 10 :: 20 : \frac{20 \times 10}{32} = 6 \text{ nearly.}$$

Therefore the number correſponding to the propoſed logarithm is .13576.

In like manner may the numbers to the following logarithms be found.

Logarithms.	Numbers.
1.23457	17.162
$\bar{3}$.73430	5423.8
1.09214	.12363
4.61230	40954

The *table of logarithms of numbers* is followed by a *Table of logarithmic Sines and Tangents, for every minute of the quadrant, with their differences.* For the explanation of this table we refer to TRIGONOMETRY, to which branch of mathematics it is intended to be applied.

We ſhall now give practical rules, illuſtrated by examples, for performing the different operations of arithmetic by logarithms.

MULTIPLICATION BY LOGARITHMS.

RULE.

TAKE out the logarithms of the factors from the table; then add them together, and their ſum will be the logarithm of the product required. Then find, by inſpection of the table, the natural number anſwering to their ſum, and it will be the product required.

Obſerving to add what is to be carried from the decimal part of the logarithm to the poſitive index or indices, or elſe ſubtract it from the negative.

Alſo adding the indices together when they are of the ſame kind, that is, both poſitive or both negative; but ſubtracting the leſs from the greater when the one is poſitive and the other negative, and prefixing the ſign of the greater to the remainder.

EXAMPLES.

Ex. 1. To multiply 2.314 by 50.62.

	Numbers.	Logarithms.
	2.314	0.36436
	50.62	1.70432
Product	117.13	2.06868

Ex. 2. To multiply 2.5819 by 3.4573.

	Numbers.	Logarithms.
	2.5819	0.41194
	3.4573	0.53874
Prod.	8.9265	0.95068

Ex. 3.

Deſcription and Uſe of the Table.

Ex. 3. To multiply 39.02, and 597.16, and .03147 together.

	Numbers.	Logarithms.
	39.02	1.59129
	597.16	2.77609
	.03147	$\bar{2}$.49790
Prod.	753.3	2.86528

Here the ſum of the poſitive indices, together with 1 which we carry, is 4, and from this we ſubtract 2, becauſe of the negative index —2.

Ex. 4. To multiply 3.586 and 2.1046, and 0.8372 and 0.0294 all together.

Numbers.	Logarithms.
3.586	0.55461
2.1046	0.32317
0.8372	$\bar{1}$.92283
0.0294	$\bar{2}$.46835
	$\bar{1}$.26896

Here the 2 to carry cancels the —2, and there remains the —1 to ſet down.

DIVISION BY LOGARITHMS.

RULE.

SUBTRACT the logarithm of the diviſor from the logarithm of the dividend, and the number anſwering to the remainder will be the logarithm of the quotient required.

Obſerving to change the ſign of the index of the diviſor from poſitive to negative, or from negative to poſitive; then take the ſum of the indices if they be of the ſame name, or their difference when they have different ſigns, with the ſign of the greater for the index to the logarithm of the quotient.

Alſo, when 1 is borrowed in the left-hand place of the decimal part of the logarithm, add it to the index of the diviſor when that index is poſitive, but ſubtract it when negative; then let the index ariſing from thence be changed, and work with it as before.

EXAMPLES.

Ex. To divide 24163 by 4567.

	Numbers.	Logarithms.
Divid.	24163	4.38315
Diviſ.	4567	3.65963
Quot.	5.2908	0.72352

Ex. To divide 37.15 by 523.76.

	Numbers.	Logarithms.
Divid.	37.15	1.56996
Diviſ.	523.76	2.71913
Quot.	.07093	$\bar{2}$.85083

Ex. 3. Divide .06314 by .007241.

	Numbers.	Logarithms.
Divid.	.06314	$\bar{2}$.80030
Diviſ.	.007241	$\bar{3}$.85980
Quot.	8.720	0.94050

Here 1 carried from the decimals to the —3 makes it —2, which taken from the other —2, leaves 0 remaining.

Ex. 4. Divide .7438 by 12.947.

	Numbers.	Logarithms.
Divid.	.7438	$\bar{1}$.87146
Diviſ.	12.947	1.11218
Quot.	.057449	$\bar{2}$.75928

Here the 1 taken from the —1 makes it become —2 to ſet down.

PROPORTION BY LOGARITHMS.

RULE.

ADD the logarithms of the ſecond and third terms, and from the ſum ſubtract the logarithm of the firſt term by the foregoing rules, the remainder will be the logarithm of the fourth term required.

Or in any compound proportion whatever, add together the logarithms of all the terms that are to be multiplied; and from that ſum take the ſum of the others, the remainder will be the logarithm of the anſwer.

But, inſtead of ſubtracting any logarithm, we may add its *arithmetical complement*, and the reſult will be the ſame. By the arithmetical complement is meant the logarithm of the reciprocal of the given number, or the remainder by taking the given logarithm from 0, or from 10, changing the beginning of the ſcale from 0 to 10; the eaſieſt way of doing which is to begin at the left hand, and ſubtract each figure from 9, except at the laſt ſignificant figure on the right hand, which muſt be ſubtracted from 10. But when the index is negative, it muſt be added to 9, and the reſt ſubtracted as before; and for every complement that is added, ſubtract 10 from the laſt ſum of the indices.

EXAMPLES.

Ex. 1. Find a fourth proportional to 72.34, 2.519, and 357.48.

	Numbers.	Logarithms.
As	72.34	1.85938
To	2.519	0.40123
So is	357.48	2.55325
		2.95448
To	12.448	1.09510

Here the logarithms of the ſecond and third terms are added together, and the logarithm of the firſt term is ſubtracted from the ſum; but by taking the arithmeti-

Description and Use of the Table.

cal complement of the first term, the work might stand thus:

As	72.34	Comp. log.	8.14062
To	2.519		0.40123
So is	357.48		2.55325
To	12.448		1.09510

Ex. 2. If the interest of 100l. for a year, or 365 days, be 4.5, What will be the interest of 279.25l. for 274 days?

As	100 / 365	Comp. long.	8.00000 / 7.43771
To	279.25 / 274		2.44599 / 2.43775
So is	4.5		0.65321
To	9.4333		0.97466

Here, instead of subtracting the sum of the logarithms of 100 and 365, we add the arithmetical complement of the logarithms of these numbers, and subtract 20 from the sum of the indices.

INVOLUTION BY LOGARITHMS.

RULE.

MULTIPLY the logarithm of the given number by the index of the power, and the number answering to the product will be the power required.

Note.—In multiplying a logarithm with a negative index by a positive number, the product will be negative. But what is to be carried from the decimal part of the logarithm will always be positive. And therefore the difference will be the index of the product, and is always to be made of the same kind with the greater.

EXAMPLES.

Ex. 1. To square the number 2.579.

	Number.	Logarithm.
Root	2.569	0.41145
The index		2
Power	6.6513	0.82290

Ex. 2. To find the cube of 3.0715.

	Number.	Logarithm.
Root	3.0715	0.48735
The index		3
Power	28.976	1.46205

Ex. 3. To raise .09163 to the fourth power.

	Number.	Logarithm.
Root	.09163	$\bar{2}$.96204
		4
Power	.000070495	$\bar{5}$.84816

Here 4 times the negative index being —8, and 3 to carry, the difference —5, is the index of the product.

Ex. 4. To raise 1.0045 to the 365th power.

	Number.	Logarithm.
Root	1.0045	0.00195
The index		365
		975
		1170
		585
Power	5.1493	.71175

EVOLUTION BY LOGARITHMS.

RULE.

DIVIDE the logarithm of the number by the index of the root, and the number answering to the quotient is the root sought.

When the index of the logarithm to be divided is negative, and does not exactly contain the divisor without some remainder, increase the index by such a number as will make it exactly divisible by the index of the root, carrying the units borrowed as so many tens to the left-hand place of the decimal, and then divide as in whole numbers.

EXAMPLES.

Ex. 1. Find the square root of 2.

	Number.	Logarithm.
Power	.2	2)0.30103
Root	1.4142	0.15051

Ex. 2. Find the 10th root of 365.

	Number.	Logarithm.
Power	365	10)2.56229
Root	1.804	0.25623

Ex. 3. To find $\sqrt{.093}$.

	Number.	Logarithm.
Power	.093	2)$\bar{2}$.96848
Root	.30496	$\bar{1}$.48424

Here the divisor 2 is contained exactly in the negative index —2, and therefore the index of the quotient is —1.

Ex. 4. To find $\sqrt[3]{.00048}$.

	Number.	Logarithm.
Power	.00048	3)$\bar{4}$.68124
Root	.078298	$\bar{2}$.89375

Here the divisor 3, not being exactly contained in —4, it is augmented by 2 to make up 6, in which the divisor is contained just 2 times, then the 2 thus borrowed being carried to the decimal figure 6, makes 26, which divided by 3 gives 8, &c.

Ex.

N.	Log.
1	00000
2	30103
3	47712
4	60206
5	69897
6	77815
7	84510
8	90309
9	95424
10	00000
11	04139
12	07918
13	11394
14	14613
15	17609
16	20412
17	23045
18	25527
19	27875
20	30103
21	32222
22	34242
23	36173
24	38021
25	39794
26	41497
27	43136
28	44716
29	46240
30	47712
31	49136
32	50515
33	51851
34	53148
35	54407
36	55630
37	56820
38	57978
39	59106
40	60206
41	61278
42	62325
43	63347
44	64345
45	65321
46	66276
47	67210
48	68124
49	69020
50	69897
51	70757
52	71600
53	72428
54	73239
55	74036
56	74819
57	75587
58	76343
59	77085
60	77815

N.	Log.
60	77815
61	78533
62	79239
63	79934
64	80618
65	81291
66	81954
67	82607
68	83251
69	83885
70	84510
71	85126
72	85733
73	86332
74	86923
75	87506
76	88081
77	88649
78	89209
79	89763
80	90309
81	90849
82	91381
83	91908
84	92428
85	92942
86	93450
87	93952
88	94448
89	94939
90	95424
91	95904
92	96379
93	96848
94	97313
95	97772
96	98227
97	98677
98	99123
99	99564
100	00000
101	00432
102	00860
103	01284
104	01703
105	02119
106	02531
107	02938
108	03342
109	03743
110	04139
111	04532
112	04922
113	05308
114	05690
115	06070
116	06446
117	06819
118	07188
119	07555
120	07918

N.	Log.
120	07918
121	08279
122	08636
123	08991
124	09342
125	09691
126	10037
127	10380
128	10721
129	11059
130	11394
131	11727
132	12057
133	12385
134	12710
135	13033
136	13354
137	13672
138	13988
139	14301
140	14613
141	14922
142	15229
143	15534
144	15836
145	16137
146	16435
147	16732
148	17026
149	17319
150	17609
151	17898
152	18184
153	18469
154	18752
155	19033
156	19312
157	19590
158	19866
159	20140
160	20412
161	20683
162	20952
163	21219
164	21484
165	21748
166	22011
167	22272
168	22531
169	22789
170	23045
171	23300
172	23553
173	23805
174	24055
175	24304
176	24551
177	24797
178	25042
179	25285
180	25527

N.	Log.
180	25527
181	25768
182	26007
183	26245
184	26482
185	26717
186	26951
187	27184
188	27416
189	27646
190	27875
191	28103
192	28330
193	28556
194	28780
195	29003
196	29226
197	29447
198	29667
199	29885
200	30103
201	30320
202	30535
203	30750
204	30963
205	31175
206	31387
207	31597
208	31806
209	32015
210	32222
211	32428
212	32634
213	32838
214	33041
215	33244
216	33445
217	33646
218	33846
219	34044
220	34242
221	34439
222	34635
223	34830
224	35025
225	35218
226	35411
227	35603
228	35793
229	35984
230	26173
231	36361
232	36549
233	36736
234	36922
235	37107
236	37291
237	37475
238	37658
239	37840
240	38021

N.	Log.
240	38021
241	38202
242	38382
243	38561
244	38739
245	38917
246	39094
247	39270
248	39445
249	39620
250	39794
251	39967
252	40140
253	40312
254	40483
255	40654
256	40824
257	40993
258	41162
259	41330
260	41497
261	41664
262	41830
263	41996
264	42160
265	42325
266	42488
267	42651
268	42813
269	42975
270	43136
271	43297
272	43457
273	43616
274	43775
275	43933
276	44091
277	44248
278	44404
279	44560
280	44716
281	44871
282	45025
283	45179
284	45332
285	45484
286	45637
287	45788
288	45939
289	46090
290	46240
291	46389
292	46538
293	46687
294	46835
295	46982
296	47129
297	47276
298	47422
299	47567
300	47712

N.	Log.
300	47712
301	47857
302	48001
303	48144
304	48287
305	48430
306	48572
307	48714
308	48855
309	48996
310	49136
311	49276
312	49415
313	49554
314	49693
315	49831
316	49969
317	50106
318	50243
319	50379
320	50515
321	50651
322	50786
323	50920
324	51055
325	51188
326	51322
327	51455
328	51587
329	51720
330	51851
331	51983
332	52114
333	52244
334	52375
335	52504
336	52634
337	52763
338	52892
339	53020
340	53148
341	53275
342	53403
343	53529
344	53656
345	53782
346	53908
347	54033
348	54158
349	54283
350	54407
351	54531
352	54654
353	54777
354	54900
355	55023
356	55145
357	55267
358	55388
359	55509
360	55630

N.	Log.
360	55630
361	55751
362	55871
363	55991
364	56110
365	56229
366	56348
367	56467
368	56585
369	56703
370	56820
371	56937
372	57054
373	57171
374	57287
375	57403
376	57519
377	57634
378	57749
379	57864
380	57978
381	58092
382	58206
383	58320
384	58433
385	58546
386	58659
387	58771
388	58883
389	58995
390	59106
391	59218
392	59329
393	59439
394	59550
395	59660
396	59770
397	59879
398	59988
399	60097
400	60206
401	60314
402	60423
403	60531
404	60638
405	60746
406	60853
407	60959
408	61066
409	61172
410	61278
411	61384
412	61490
413	61595
414	61700
415	61805
416	61909
417	62014
418	62118
419	62221
420	62325

N.	Log.
420	62325
421	62428
422	62531
423	62634
424	62737
425	62839
426	62941
427	63043
428	63144
429	63246
430	63347
431	63448
432	63548
433	63649
434	63749
435	63849
436	63949
437	64048
438	64147
439	64246
440	64345
441	64444
442	64542
443	64640
444	64738
445	64836
446	64933
447	65031
448	65128
449	65225
450	65321
451	65418
452	65514
453	65610
454	65706
455	65801
456	65896
457	65992
458	66087
459	66181
460	66276
461	66370
462	66464
463	66558
464	66652
465	66745
466	66839
467	66932
468	67025
469	67117
470	67210
471	67302
472	67394
473	67486
474	67578
475	67669
476	67761
477	67852
478	67943
479	68034
480	68124

N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.
480	68124	540	73239	600	77815	660	81954	720	85733	780	89209	840	92428	900	95424
481	68215	541	73320	601	77887	661	82020	721	85794	781	89265	841	92480	901	95472
482	68305	542	73400	602	77960	662	82086	722	85854	782	89321	842	92531	902	95521
483	68395	543	73480	603	78032	663	82151	723	85914	783	89376	843	92583	903	95569
484	68485	544	73560	604	78104	664	82217	724	85974	784	89432	844	92634	904	95617
485	68574	545	73640	605	78176	665	82282	725	86034	785	89487	845	92686	905	95665
486	68664	546	73719	606	78247	666	82347	726	86094	786	89542	846	92737	906	95713
487	68753	547	73799	607	78319	667	82413	727	86153	787	89597	847	92788	907	95761
488	68842	548	73878	608	78390	668	82478	728	86213	788	89653	848	92840	908	95809
489	68931	549	73957	609	78462	669	82543	729	86273	789	89708	849	92891	909	95856
490	69020	550	74036	610	78533	670	82607	730	86332	790	89763	850	92942	910	95904
491	69108	551	74115	611	78604	671	82672	731	86392	791	89818	851	92993	911	95952
492	69197	552	74194	612	78675	672	82737	732	86451	792	89873	852	93044	912	95999
493	69285	553	74273	613	78746	673	82802	733	86510	793	89927	853	93095	913	96047
494	69373	554	74351	614	78817	674	82866	734	86570	794	89982	854	93146	914	96095
495	69461	555	74429	615	78888	675	82930	735	86629	795	90037	855	93197	915	96142
496	69548	556	74507	616	78958	676	82995	736	86688	796	90091	856	93247	916	96190
497	69636	557	74586	617	79029	677	83059	737	86747	797	90146	857	93298	917	96237
498	69723	558	74663	618	79099	678	83123	738	86806	798	90200	858	93349	918	96284
499	69810	559	74741	619	79169	679	83187	739	86864	799	90255	859	93399	919	96332
500	69897	560	74819	620	79239	680	83251	740	86923	800	90309	860	93450	920	96379
501	69984	561	74896	621	79309	681	83315	741	86982	801	90363	861	93500	921	96426
502	70070	562	74974	622	79379	682	83378	742	87040	802	90417	862	93551	922	96473
503	70157	563	75051	623	79449	683	83442	743	87099	803	90472	863	93601	923	96520
504	70243	564	75128	624	79518	684	83506	744	87157	804	90526	864	93651	924	96567
505	70329	565	75205	625	79588	685	83569	745	87216	805	90580	865	93702	925	96614
506	70415	566	75282	626	79657	686	83632	746	87274	806	90634	866	93752	926	96661
507	70501	567	75358	627	79727	687	83696	747	87332	807	90687	867	93802	927	96708
508	70586	568	75435	628	79796	688	83759	748	87390	808	90741	868	93852	928	96755
509	70672	569	75511	629	79865	689	83822	749	87448	809	90795	869	93902	929	96802
510	70757	570	75587	630	79934	690	83885	750	87506	810	90849	870	93952	930	96848
511	70842	571	75664	631	80003	691	83948	751	87564	811	90902	871	94002	931	96895
512	70927	572	75740	632	80072	692	84011	752	87622	812	90956	872	94052	932	96942
513	71012	573	75815	633	80140	693	84073	753	87679	813	91009	873	94101	933	96988
514	71096	574	75891	634	80209	694	84136	754	87737	814	91062	874	94151	934	97035
515	71181	575	75967	635	80277	695	84198	755	87795	815	91116	875	94201	935	97081
516	71265	576	76042	636	80346	696	84261	756	87852	816	91169	876	94250	936	97128
517	71349	577	76118	637	80414	697	84323	757	87910	817	91222	877	94300	937	97174
518	71433	578	76193	638	80482	698	84386	758	87967	818	91275	878	94349	938	97220
519	71517	579	76268	639	80550	699	84448	759	88024	819	91328	879	94399	939	97267
520	71600	580	76343	640	80618	700	84510	760	88081	820	91381	880	94448	940	97313
521	71684	581	76418	641	80686	701	84572	761	88138	821	91434	881	94498	941	97359
522	71767	582	76492	642	80754	702	84634	762	88195	822	91487	882	94547	942	97405
523	71850	583	76567	643	80821	703	84696	763	88252	823	91540	883	94596	943	97451
524	71933	584	76641	644	80889	704	84757	764	88309	824	91593	884	94645	944	97497
525	72016	585	76716	645	80956	705	84819	765	88366	825	91645	885	94694	945	97543
526	72099	586	76790	646	81023	706	84880	766	88423	826	91698	886	94743	946	97589
527	72181	587	76864	647	81090	707	84942	767	88480	827	91751	887	94792	947	97635
528	72263	588	76938	648	81158	708	85003	768	88536	828	91803	888	94841	948	97681
529	72346	589	77012	649	81224	709	85065	769	88593	829	91855	889	94890	949	97727
530	72428	590	77085	650	81291	710	85126	770	88649	830	91908	890	94939	950	97772
531	72509	591	77159	651	81358	711	85187	771	88705	831	91960	891	94988	951	97818
532	72591	592	77232	652	81425	712	85248	772	88762	832	92012	892	95036	952	97864
533	72673	593	77305	653	81491	713	85309	773	88818	833	92065	893	95085	953	97909
534	72754	594	77379	654	81558	714	85370	774	88874	834	92117	894	95134	954	97955
535	72835	595	77452	655	81624	715	85431	775	88930	835	92169	895	95182	955	98000
536	72916	596	77525	656	81690	716	85491	776	88986	836	92221	896	95231	956	98046
537	72997	597	77597	657	81757	717	85552	777	89042	837	92273	897	95279	957	98091
538	73078	598	77670	658	81823	718	85612	778	89098	838	92324	898	95328	958	98137
539	73159	599	77743	659	81889	719	85673	779	89154	839	92376	899	95376	959	98182
540	73239	600	77815	660	81954	720	85733	780	89209	840	92428	900	95424	960	98227

N.	Log.	D.	N.	Log.	D.	N.	Log.	D.	N.	Log.	D.	N.	Log.	D.	N.	Log.	D.	N.	Log.	D.	N.	Log.	D.
960	98227		1020	00860		1080	03342		1140	05690		1200	07918		1260	10037		1320	12057		1380	13988	
961	98272	43	1021	00903	43	1081	03383	41	1141	05729	39	1201	07954	36	1261	10072	35	1321	12090	33	1381	14019	31
962	98318	42	1022	00945	42	1082	03423	40	1142	05767	38	1202	07990	37	1262	10106	34	1322	12123	33	1382	14051	32
963	98363	43	1023	00988	43	1083	03463	40	1143	05805	38	1203	08027	36	1263	10140	34	1323	12156	33	1383	14082	31
964	98408	42	1024	01030	42	1084	03503	40	1144	05843	38	1204	08063	36	1264	10175	35	1324	12189	33	1384	14114	32
965	98453	43	1025	01072	42	1085	03543	40	1145	05881	37	1205	08099	36	1265	10209	34	1325	12222	32	1385	14145	31
966	98498		1026	01115		1086	03583		1146	05918		1206	08135		1266	10243		1326	12254		1386	14176	
967	98543	42	1027	01157	42	1087	03623	40	1147	05956	38	1207	08171	36	1267	10278	35	1327	12287	33	1387	14208	32
968	98588	42	1028	01199	42	1088	03663	40	1148	05994	38	1208	08207	36	1268	10312	34	1328	12320	33	1388	14239	31
969	98632	43	1029	01242	42	1089	03703	40	1149	06032	38	1209	08243	36	1269	10346	34	1329	12352	32	1389	14270	31
970	98677	42	1030	01284	42	1090	03743	39	1150	06070	38	1210	08279	35	1270	10380	35	1330	12385	33	1390	14301	31
971	98722		1031	01326		1091	03782		1151	06108		1211	08314		1271	10415		1331	12418		1391	14333	
972	98767	42	1032	01368	42	1092	03822	40	1152	06145	37	1212	08350	36	1272	10449	34	1332	12450	32	1392	14364	31
973	98811	44	1033	01410	42	1093	03862	40	1153	06183	38	1213	08386	36	1273	10483	34	1333	12483	33	1393	14395	31
974	98856	42	1034	01452	42	1094	03902	40	1154	06221	38	1214	08422	36	1274	10517	34	1334	12516	33	1394	14426	31
975	98900	42	1035	01494	42	1095	03941	39	1155	06258	37	1215	08458	36	1275	10551	34	1335	12548	32	1395	14457	31
976	98945		1036	01536		1096	03981		1156	06296		1216	08493		1276	10585		1336	12581		1396	14489	
977	98989	42	1037	01578	42	1097	04021	40	1157	06333	38	1217	08529	36	1277	10619	34	1337	12613	32	1397	14520	31
978	99034	42	1038	01620	42	1098	04060	39	1158	06371	38	1218	08565	36	1278	10653	34	1338	12646	33	1398	14551	31
979	99078	42	1039	01662	42	1099	04100	40	1159	06408	37	1219	08600	35	1279	10687	34	1339	12678	32	1399	14582	31
980	99123	41	1040	01703	42	1100	04139	39	1160	06446	38	1220	08636	36	1280	10721	34	1340	12710	32	1400	14613	31
981	99167		1041	01745		1101	04179		1161	06485		1221	08672		1281	10755		1341	12743		1401	14644	
982	99211	42	1042	01787	42	1102	04218	39	1162	06521	37	1222	08707	35	1282	10789	34	1342	12775	32	1402	14675	31
983	99255	44	1043	01828	41	1103	04258	40	1163	06558	37	1223	08743	36	1283	10823	34	1343	12808	33	1403	14706	31
984	99300	42	1044	01870	42	1104	04297	39	1164	06595	38	1224	08778	35	1284	10857	34	1344	12840	32	1404	14737	31
985	99344	42	1045	01912	41	1105	04336	40	1165	06633	37	1225	08814	36	1285	10890	33	1345	12872	32	1405	14768	31
986	99388		1046	01953		1106	04376		1166	06670		1226	08849		1286	10924		1346	12905		1406	14799	
987	99432	44	1047	01995	42	1107	04415	39	1167	06707	37	1227	08884	35	1287	10958	34	1347	12937	32	1407	14829	30
988	99476	42	1048	02036	41	1108	04454	39	1168	06744	37	1228	08920	36	1288	10992	34	1348	12969	32	1408	14860	31
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5795	76305	8	5855	76753	7	5915	77195	8	5975	77634	7	6035	78068	7	6095	78497	7	6155	78923	7	6215	79344	7
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6248	79574	7	6308	79989	7	6368	80400	7	6428	80808	7	6488	81211	7	6548	81611	7	6608	82007	7	6668	82400	6
6249	79581	7	6309	79996	7	6369	80407	7	6429	80814	6	6489	81218	6	6549	81617	6	6609	82014	7	6669	82406	6
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6721	82743	7	6781	83129	6	6841	83512	6	6901	83891	6	6961	84267	6	7021	84640	6	7081	85009	6	7141	85376	6
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6725	82769	7	6785	83155	6	6845	83537	7	6905	83916	7	6965	84292	6	7025	84665	7	7085	85034	6	7145	85400	6
6726	82776	6	6786	83161	7	6846	83544	6	6906	83923	6	6966	84298	7	7026	84671	6	7086	85040	6	7146	85406	6
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6728	82789	6	6788	83174	7	6848	83556	7	6908	83935	7	6968	84311	6	7028	84683	6	7088	85052	6	7148	85418	6
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6730	82802	6	6790	83187	6	6850	83569	6	6910	83948	6	6970	84323	7	7030	84696	6	7090	85065	6	7150	85431	6
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6741	82872	7	6801	83257	7	6861	83639	6	6921	84017	6	6981	84392	6	7041	84763	6	7101	85132	6	7161	85497	6
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6749	82924	6	6809	83308	7	6869	83689	7	6929	84067	6	6989	84442	6	7049	84813	6	7109	85181	6	7169	85546	6
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6767	83040	6	6827	83423	6	6887	83803	6	6947	84180	6	7007	84553	6	7067	84924	6	7127	85291	6	7187	85655	6
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6771	83065	7	6831	83448	7	6891	83828	7	6951	84205	6	7011	84578	6	7071	84948	6	7131	85315	6	7191	85679	6
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6774	83085	7	6834	83467	6	6894	83847	6	6954	84223	6	7014	84597	6	7074	84967	6	7134	85333	6	7194	85697	6
6775	83091	6	6835	83474	6	6895	83853	7	6955	84230	7	7015	84603	6	7075	84973	6	7135	85339	6	7195	85703	6
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7202	85745	6	7262	86106	6	7322	86463	6	7382	86817	6	7442	87169	6	7502	87518	6	7562	87864	5	7622	88207	6
7203	85751	6	7263	86112	6	7323	86469	6	7383	86823	6	7443	87175	6	7503	87523	5	7563	87869	6	7623	88213	6
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7205	85763	6	7265	86124	6	7325	86481	6	7385	86835	6	7445	87186	5	7505	87535	6	7565	87881	6	7625	88224	6
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7209	85788	6	7269	86147	6	7329	86504	6	7389	86859	5	7449	87210	6	7509	87558	6	7569	87904	6	7629	88247	5
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7211	85800	6	7271	86159	6	7331	86516	6	7391	86870	6	7451	87221	6	7511	87570	6	7571	87915	6	7631	88258	6
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7215	85824	6	7275	86183	6	7335	86540	6	7395	86894	6	7455	87245	6	7515	87593	6	7575	87938	6	7635	88281	6
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7225	85884	6	7285	86243	6	7345	86599	6	7405	86953	5	7465	87303	6	7525	87651	5	7585	87996	5	7645	88338	5
7226	85890	6	7286	86249	6	7346	86605	6	7406	86958	6	7466	87309	6	7526	87656	6	7586	88001	6	7646	88343	6
7227	85896	6	7287	86255	6	7347	86611	6	7407	86964	6	7467	87315	6	7527	87662	6	7587	88007	6	7647	88349	6
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7231	85920	6	7291	86279	6	7351	86635	6	7411	86988	6	7471	87338	6	7531	87685	6	7591	88030	6	7651	88372	5
7232	85926	6	7292	86285	6	7352	86641	5	7412	86994	5	7472	87344	5	7532	87691	5	7592	88036	5	7652	88377	6
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7234	85938	6	7294	86297	6	7354	86652	6	7414	87005	6	7474	87355	6	7534	87703	5	7594	88047	6	7654	88389	6
7235	85944	6	7295	86303	6	7355	86658	6	7415	87011	6	7475	87361	6	7535	87708	6	7595	88053	5	7655	88395	5
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7241	85980	6	7301	86338	6	7361	86694	6	7421	87046	6	7481	87396	6	7541	87743	6	7601	88087	6	7661	88429	5
7242	85986	6	7302	86344	6	7362	86700	5	7422	87052	6	7482	87402	6	7542	87749	6	7602	88093	5	7662	88434	6
7243	85992	6	7303	86350	6	7363	86705	6	7423	87058	6	7483	87408	5	7543	87754	6	7603	88098	6	7663	88440	6
7244	85998	6	7304	86356	6	7364	86711	6	7424	87064	6	7484	87413	6	7544	87760	6	7604	88104	6	7664	88446	5
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7246	86010	6	7306	86368	6	7366	86723	6	7426	87075	6	7486	87425	6	7546	87772	6	7606	88116	5	7666	88457	6
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7250	86034	6	7310	86392	6	7370	86747	6	7430	87099	6	7490	87448	6	7550	87795	6	7610	88138	5	7670	88480	5
7251	86040	6	7311	86398	6	7371	86753	6	7431	87105	6	7491	87454	6	7551	87800	5	7611	88144	6	7671	88485	6
7252	86046	6	7312	86404	6	7372	86759	5	7432	87111	5	7492	87460	6	7552	87806	6	7612	88150	6	7672	88491	6
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7254	86058	6	7314	86415	6	7374	86770	6	7434	87122	6	7494	87471	6	7554	87818	6	7614	88161	6	7674	88502	6
7255	86064	6	7315	86421	6	7375	86776	6	7435	87128	6	7495	87477	6	7555	87823	5	7615	88167	6	7675	88508	6
7256	86070	6	7316	86427	6	7376	86782	6	7436	87134	6	7496	87483	6	7556	87829	6	7616	88173	6	7676	88513	5
7257	86076	6	7317	86433	6	7377	86788	6	7437	87140	6	7497	87489	6	7557	87835	6	7617	88178	5	7677	88519	6
7258	86082	6	7318	86439	6	7378	86794	6	7438	87146	6	7498	87495	5	7558	87841	6	7618	88184	6	7678	88525	6
7259	86088	6	7319	86445	6	7379	86800	6	7439	87151	5	7499	87500	6	7559	87846	5	7619	88190	6	7679	88530	5
7260	86094	6	7320	86451	6	7380	86806	6	7440	87157	6	7500	87506	6	7560	87852	6	7620	88195	6	7680	88536	6

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7681	88542	6	7741	88880	6	7801	89215	6	7861	89548	6	7921	89878	5	7981	90206	6	8041	90531	5	8101	90854	5
7682	88547	5	7742	88885	5	7802	89221	5	7862	89553	5	7922	89883	5	7982	90211	5	8042	90536	5	8102	90859	5
7683	88553	6	7743	88891	6	7803	89226	6	7863	89559	6	7923	89889	6	7983	90217	6	8043	90542	6	8103	90865	6
7684	88559	6	7744	88897	6	7804	89232	6	7864	89564	5	7924	89894	5	7984	90222	5	8044	90547	5	8104	90870	5
7685	88564	5	7745	88902	5	7805	89237	5	7865	89570	6	7925	89900	6	7985	90227	5	8045	90553	6	8105	90875	5
7686	88570	6	7746	88908	6	7806	89243	6	7866	89575	5	7926	89905	5	7986	90233	6	8046	90558	5	8106	90881	6
7687	88576	5	7747	88913	5	7807	89248	5	7867	89581	6	7927	89911	6	7987	90238	5	8047	90563	5	8107	90886	5
7688	88581	6	7748	88919	6	7808	89254	6	7868	89586	5	7928	89916	5	7988	90244	6	8048	90569	6	8108	90891	6
7689	88587	6	7749	88925	5	7809	89260	5	7869	89592	6	7929	89922	6	7989	90249	5	8049	90574	5	8109	90897	5
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7692	88604	6	7752	88941	5	7812	89276	5	7872	89609	6	7932	89938	5	7992	90266	6	8052	90590	6	8112	90913	5
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7694	88615	6	7754	88953	6	7814	89287	5	7874	89620	6	7934	89949	5	7994	90276	6	8054	90601	6	8114	90924	5
7695	88621	6	7755	88958	5	7815	89293	6	7875	89625	5	7935	89955	6	7995	90282	5	8055	90607	5	8115	90929	5
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7697	88632	6	7757	88969	6	7817	89304	6	7877	89636	6	7937	89966	5	7997	90293	6	8057	90617	5	8117	90940	5
7698	88638	5	7758	88975	5	7818	89310	5	7878	89642	5	7938	89971	6	7998	90298	5	8058	90623	6	8118	90945	5
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7700	88649	6	7760	88986	5	7820	89321	5	7880	89653	5	7940	89982	6	8000	90309	5	8060	90634	5	8120	90956	5
7701	88655		7761	88992		7821	89326		7881	89658		7941	89988		8001	90314		8061	90639		8121	90961	
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7705	88677	5	7765	89014	6	7825	89348	5	7885	89680	5	7945	90009	5	8005	90336	5	8065	90660	6	8125	90982	5
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7711	88711	6	7771	89048		7831	89382		7891	89713		7951	90042		8011	90369		8071	90693		8131	91014	
7712	88717	6	7772	89053	5	7832	89387	5	7892	89719	6	7952	90048	6	8012	90374	5	8072	90698	5	8132	91020	6
7713	88722	5	7773	89059	6	7833	89393	6	7893	89724	5	7953	90053	5	8013	90380	6	8073	90703	5	8133	91025	5
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7716	88739	6	7776	89076		7836	89409		7896	89741		7956	90069		8016	90396		8076	90720		8136	91041	
7717	88745	5	7777	89081	5	7837	89415	6	7897	89746	6	7957	90075	6	8017	90401	5	8077	90725	5	8137	91046	5
7718	88750	6	7778	89087	6	7838	89421	5	7898	89752	5	7958	90080	5	8018	90407	6	8078	90730	6	8138	91052	6
7719	88756	6	7779	89092	5	7839	89426	6	7899	89757	6	7959	90086	6	8019	90412	5	8079	90736	5	8139	91057	5
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7721	88767		7781	89104		7841	89437		7901	89768		7961	90097		8021	90423		8081	90747		8141	91068	
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7726	88795		7786	89131		7846	89465		7906	89796		7966	90124		8026	90450		8086	90773		8146	91094	
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7733	88835	6	7793	89170	6	7853	89504	6	7913	89834	5	7973	90162	5	8033	90488	6	8093	90811	5	8153	91132	6
7734	88840	5	7794	89176	6	7854	89509	5	7914	89840	6	7974	90168	6	8034	90493	5	8094	90816	6	8154	91137	5
7735	88846	6	7795	89182	6	7855	89515	6	7915	89845	5	7975	90173	5	8035	90499	6	8095	90822	5	8155	91142	5
7736	88852		7796	89187		7856	89520		7916	89851		7976	90179		8036	90504		8096	90827		8156	91148	
7737	88857	5	7797	89193	6	7857	89526	6	7917	89856	6	7977	90184	5	8037	90509	5	8097	90832	5	8157	91153	5
7738	88863	6	7798	89198	5	7858	89531	5	7918	89862	6	7978	90189	6	8038	90515	6	8098	90838	6	8158	91158	6
7739	88868	5	7799	89204	6	7859	89537	6	7919	89867	5	7979	90195	5	8039	90520	5	8099	90843	5	8159	91164	5
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8164	91190	5	8224	91508	6	8284	91824	5	8344	92137	5	8404	92449	6	8464	92758	5	8524	93064	5	8584	93369	5
8165	91196	6	8225	91514	5	8285	91829	5	8345	92143	5	8405	92454	5	8465	92763	5	8525	93069	5	8585	93374	5
8166	91201	5	8226	91519	5	8286	91834	5	8346	92148	6	8406	92459	5	8466	92768	5	8526	93075	5	8586	93379	5
8167	91206	5	8227	91524	6	8287	91840	5	8347	92153	5	8407	92464	5	8467	92773	5	8527	93080	5	8587	93384	5
8168	91212	6	8228	91529	5	8288	91845	5	8348	92158	5	8408	92469	5	8468	92778	5	8528	93085	5	8588	93389	5
8169	91217	5	8229	91535	5	8289	91850	5	8349	92163	6	8409	92474	6	8469	92783	6	8529	93090	5	8589	93394	5
8170	91222	5	8230	91540	6	8290	91855	5	8350	92169	6	8410	92480	5	8470	92788	5	8530	93095	5	8590	93399	5
8171	91228	6	8231	91545	6	8291	91861	5	8351	92174	5	8411	92485	5	8471	92793	5	8531	93100	5	8591	93404	5
8172	91233	5	8232	91551	5	8292	91866	5	8352	92179	5	8412	92490	5	8472	92799	6	8532	93105	5	8592	93409	5
8173	91238	5	8233	91556	5	8293	91871	5	8353	92184	5	8413	92495	5	8473	92804	5	8533	93110	5	8593	93414	6
8174	91243	6	8234	91561	5	8294	91876	6	8354	92189	6	8414	92500	5	8474	92809	5	8534	93115	5	8594	93420	5
8175	91249	5	8235	91566	6	8295	91882	5	8355	92195	5	8415	92505	6	8475	92814	5	8535	93120	5	8595	93425	5
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8182	91286	5	8242	91603	6	8302	91918	5	8362	92231	5	8422	92542	5	8482	92850	5	8542	93156	5	8602	93460	5
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8186	91307	5	8246	91624	6	8306	91939	5	8366	92252	5	8426	92562	5	8486	92870	5	8546	93176	5	8606	93480	5
8187	91312	6	8247	91630	5	8307	91944	5	8367	92257	6	8427	92567	5	8487	92875	5	8547	93181	6	8607	93485	5
8188	91318	5	8248	91635	5	8308	91950	5	8368	92262	5	8428	92572	6	8488	92881	5	8548	93186	5	8608	93490	6
8189	91323	5	8249	91640	5	8309	91955	6	8369	92267	5	8429	92578	5	8489	92886	5	8549	93192	5	8609	93495	5
8190	91328	6	8250	91645	5	8310	91960	5	8370	92273	5	8430	92583	5	8490	92891	5	8550	93197	5	8610	93500	5
8191	91334	5	8251	91651	5	8311	91965	5	8371	92278	6	8431	92588	5	8491	92896	5	8551	93202	5	8611	93505	5
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8195	91355	5	8255	91672	5	8315	91986	5	8375	92298	6	8435	92609	5	8495	92916	5	8555	93222	5	8615	93526	5
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8197	91365	6	8257	91682	5	8317	91997	5	8377	92309	5	8437	92619	5	8497	92927	5	8557	93232	5	8617	93536	5
8198	91371	5	8258	91687	6	8318	92002	5	8378	92314	5	8438	92624	5	8498	92932	5	8558	93237	5	8618	93541	5
8199	91376	5	8259	91693	5	8319	92007	5	8379	92319	6	8439	92629	5	8499	92937	5	8559	93242	5	8619	93546	5
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8201	91387	5	8261	91703	6	8321	92018	5	8381	92330	5	8441	92639	5	8501	92947	6	8561	93252	6	8621	93556	5
8202	91392	5	8262	91709	5	8322	92023	5	8382	92335	5	8442	92645	5	8502	92952	5	8562	93258	5	8622	93561	5
8203	91397	5	8263	91714	5	8323	92028	5	8383	92340	5	8443	92650	5	8503	92957	5	8563	93263	5	8623	93566	5
8204	91403	6	8264	91719	5	8324	92033	5	8384	92345	5	8444	92655	5	8504	92962	5	8564	93268	5	8624	93571	5
8205	91408	5	8265	91724	6	8325	92038	6	8385	92350	6	8445	92660	5	8505	92967	6	8565	93273	5	8625	93576	5
8206	91413	5	8266	91730	5	8326	92044	5	8386	92355	6	8446	92665	5	8506	92973	5	8566	93278	5	8626	93581	5
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8210	91434	6	8270	91751	6	8330	92065	5	8390	92376	5	8450	92686	5	8510	92993	5	8570	93298	5	8630	93601	5
8211	91440	5	8271	91756	5	8331	92070	5	8391	92381	6	8451	92691	5	8511	92998	5	8571	93303	5	8631	93606	5
8212	91445	5	8272	91761	5	8332	92075	5	8392	92387	5	8452	92696	5	8512	93003	5	8572	93308	5	8632	93611	5
8213	91450	6	8273	91766	6	8333	92080	5	8393	92392	5	8453	92701	5	8513	93008	5	8573	93313	5	8633	93616	5
8214	91455	6	8274	91772	5	8334	92085	5	8394	92397	6	8454	92706	5	8514	93013	5	8574	93318	5	8634	93621	5
8215	91461	5	8275	91777	5	8335	92091	5	8395	92402	5	8455	92711	5	8515	93018	6	8575	93323	5	8635	93626	5
8216	91466	5	8276	91782	5	8336	92096	6	8396	92407	5	8456	92716	6	8516	93024	5	8576	93328	6	8636	93631	5
8217	91471	6	8277	91787	6	8337	92101	5	8397	92412	5	8457	92722	5	8517	93029	5	8577	93334	5	8637	93636	5
8218	91477	5	8278	91793	5	8338	92106	5	8398	92418	5	8458	92727	5	8518	93034	5	8578	93339	5	8638	93641	5
8219	91482	5	8279	91798	5	8339	92111	6	8399	92423	5	8459	92732	5	8519	93039	5	8579	93344	5	8639	93646	5
8220	91487	5	8280	91803	5	8340	92117	5	8400	92428	5	8460	92737	5	8520	93044	5	8580	93349	5	8640	93651	5

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8642	93661	5	8702	93962	5	8762	94260	5	8822	94557	5	8882	94851	5	8942	95143	4	9002	95434	5	9062	95722	4
8643	93666	5	8703	93967	5	8763	94265	5	8823	94562	5	8883	94856	5	8943	95148	5	9003	95439	5	9063	95727	5
8644	93671	5	8704	93972	5	8764	94270	5	8824	94567	4	8884	94861	5	8944	95153	5	9004	95444	5	9064	95732	5
8645	93676	6	8705	93977	5	8765	94275	5	8825	94571	5	8885	94866	5	8945	95158	4	9005	95448	5	9065	95737	5
8646	93682	5	8706	93982	5	8766	94280	5	8826	94576	5	8886	94871	5	8946	95163	5	9006	95453	5	9066	95742	5
8647	93687	5	8707	93987	5	8767	94285	5	8827	94581	5	8887	94876	5	8947	95168	5	9007	95458	5	9067	95746	4
8648	93692	5	8708	93992	5	8768	94290	5	8828	94586	5	8888	94880	4	8948	95173	5	9008	95463	5	9068	95751	5
8649	93697	5	8709	93997	5	8769	94295	5	8829	94591	5	8889	94885	5	8949	95177	4	9009	95468	5	9069	95756	5
8650	93702	5	8710	94002	5	8770	94300	5	8830	94596	5	8890	94890	5	8950	95182	5	9010	95472	4	9070	95761	5
8651	93707	5	8711	94007	5	8771	94305	5	8831	94601	5	8891	94895	5	8951	95187	5	9011	95477	5	9071	95766	5
8652	93712	5	8712	94012	5	8772	94310	5	8832	94606	5	8892	94900	5	8952	95192	5	9012	95482	5	9072	95770	4
8653	93717	5	8713	94017	5	8773	94315	5	8833	94611	5	8893	94905	5	8953	95197	5	9013	95487	5	9073	95775	5
8654	93722	5	8714	94022	5	8774	94320	5	8834	94616	5	8894	94910	5	8954	95202	5	9014	95492	5	9074	95780	5
8655	93727	5	8715	94027	5	8775	94325	5	8835	94621	5	8895	94915	5	8955	95207	5	9015	95497	5	9075	95785	5
8656	93732	5	8716	94032	5	8776	94330	5	8836	94626	5	8896	94919	4	8956	95211	4	9016	95501	4	9076	95789	4
8657	93737	5	8717	94037	5	8777	94335	5	8837	94630	4	8897	94924	5	8957	95216	5	9017	95506	5	9077	95794	5
8658	93742	5	8718	94042	5	8778	94340	5	8838	94635	5	8898	94929	5	8958	95221	5	9018	95511	5	9078	95799	5
8659	93747	5	8719	94047	5	8779	94345	5	8839	94640	5	8899	94934	5	8959	95226	5	9019	95516	5	9079	95804	5
8660	93752	5	8720	94052	5	8780	94349	4	8840	94645	5	8900	94939	5	8960	95231	5	9020	95521	4	9080	95809	4
8661	93757	5	8721	94057	5	8781	94354	5	8841	94650	5	8901	94944	5	8961	95236	5	9021	95525	5	9081	95813	5
8662	93762	5	8722	94062	5	8782	94359	5	8842	94655	5	8902	94949	5	8962	95240	4	9022	95530	5	9082	95818	5
8663	93767	5	8723	94067	5	8783	94364	5	8843	94660	5	8903	94954	5	8963	95245	5	9023	95535	5	9083	95823	5
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8665	93777	5	8725	94077	5	8785	94374	5	8845	94670	5	8905	94963	5	8965	95255	5	9025	95545	5	9085	95832	5
8666	93782	5	8726	94082	5	8786	94379	5	8846	94675	5	8906	94968	5	8966	95260	5	9026	95550	5	9086	95837	5
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8671	93807	5	8731	94106	5	8791	94404	5	8851	94699	5	8911	94993	5	8971	95284	5	9031	95574	5	9091	95861	5
8672	93812	5	8732	94111	5	8792	94409	5	8852	94704	5	8912	94998	4	8972	95289	5	9032	95578	4	9092	95866	5
8673	93817	5	8733	94116	5	8793	94414	5	8853	94709	5	8913	95002	5	8973	95294	5	9033	95583	5	9093	95871	5
8674	93822	5	8734	94121	5	8794	94419	5	8854	94714	5	8914	95007	5	8974	95299	4	9034	95588	5	9094	95875	4
8675	93827	5	8735	94126	5	8795	94424	5	8855	94719	5	8915	95012	5	8975	95305	5	9035	95593	5	9095	95880	5
8676	93832	5	8736	94131	5	8796	94429	4	8856	94724	5	8916	95017	5	8976	95308	5	9036	95598	5	9096	95885	5
8677	93837	5	8737	94136	5	8797	94433	5	8857	94729	5	8917	95022	5	8977	95313	5	9037	95602	5	9097	95890	5
8678	93842	5	8738	94141	5	8798	94438	5	8858	94734	4	8918	95027	5	8978	95318	5	9038	95607	5	9098	95895	5
8679	93847	5	8739	94146	5	8799	94443	5	8859	94738	5	8919	95032	5	8979	95323	4	9039	95612	5	9099	95899	4
8680	93852	5	8740	94151	5	8800	94448	5	8860	94743	5	8920	95036	5	8980	95328	5	9040	95617	5	9100	95904	5
8681	93857	5	8741	94156	5	8801	94453	5	8861	94748	5	8921	95041	5	8981	95332	5	9041	95622	5	9101	95909	5
8682	93862	5	8742	94161	5	8802	94458	5	8862	94753	5	8922	95046	5	8982	95337	5	9042	95626	4	9102	95914	4
8683	93867	5	8743	94166	5	8803	94463	5	8863	94758	5	8923	95051	5	8983	95342	5	9043	95631	5	9103	95918	5
8684	93872	5	8744	94171	5	8804	94468	5	8864	94763	5	8924	95056	5	8984	95347	5	9044	95636	5	9104	95923	5
8685	93877	5	8745	94176	5	8805	94473	5	8865	94768	5	8925	95061	5	8985	95352	5	9045	95641	5	9105	95928	5
8686	93882	5	8746	94181	5	8806	94478	5	8866	94773	5	8926	95066	5	8986	95357	5	9046	95646	5	9106	95933	5
8687	93887	5	8747	94186	5	8807	94483	5	8867	94778	5	8927	95071	4	8987	95361	5	9047	95650	4	9107	95938	4
8688	93892	5	8748	94191	5	8808	94488	5	8868	94783	5	8928	95075	5	8988	95366	5	9048	95655	5	9108	95942	5
8689	93897	5	8749	94196	5	8809	94493	5	8869	94787	4	8929	95080	5	8989	95371	5	9049	95660	5	9109	95947	5
8690	93902	5	8750	94201	5	8810	94498	5	8870	94792	5	8930	95085	5	8990	95376	5	9050	95665	5	9110	95952	5
8691	93907	5	8751	94206	5	8811	94503	5	8871	94797	5	8931	95090	5	8991	95381	5	9051	95670	5	9111	95957	4
8692	93912	5	8752	94211	5	8812	94507	4	8872	94802	5	8932	95095	5	8992	95386	4	9052	95674	5	9112	95961	5
8693	93917	5	8753	94216	5	8813	94512	5	8873	94807	5	8933	95100	5	8993	95390	5	9053	95679	5	9113	95966	5
8694	93922	5	8754	94221	5	8814	94517	5	8874	94812	5	8934	95105	5	8994	95395	5	9054	95684	5	9114	95971	5
8695	93927	5	8755	94226	5	8815	94522	5	8875	94817	5	8935	95109	4	8995	95400	5	9055	95689	5	9115	95976	5
8696	93932	5	8756	94231	5	8816	94527	5	8876	94822	5	8936	95114	5	8996	95405	5	9056	95694	5	9116	95980	4
8697	93937	5	8757	94236	5	8817	94532	5	8877	94827	5	8937	95119	5	8997	95410	5	9057	95698	4	9117	95985	5
8698	93942	5	8758	94240	4	8818	94537	5	8878	94832	4	8938	95124	5	8998	95415	5	9058	95703	5	9118	95990	5
8699	93947	5	8759	94245	5	8819	94542	5	8879	94836	5	8939	95129	5	8999	95419	5	9059	95708	5	9119	95995	5
8700	93952	5	8760	94250	5	8820	94547	5	8880	94841	5	8940	95134	5	9000	95424	5	9060	95713	5	9120	96000	4

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9121	96004	5	9181	96289	5	9241	96572	5	9301	96853	5	9361	97132	4	9421	97410	5	9481	97685	4	9541	97959	4
9122	96009	5	9182	96294	4	9242	96577	5	9302	96858	5	9362	97137	5	9422	97414	5	9482	97690	5	9542	97964	5
9123	96014	5	9183	96298	5	9243	96581	4	9303	96862	5	9363	97142	5	9423	97419	4	9483	97695	5	9543	97968	4
9124	96019	5	9184	96303	5	9244	96586	5	9304	96867	5	9364	97146	5	9424	97424	5	9484	97699	4	9544	97973	5
9125	96023	4	9185	96308	5	9245	96591	5	9305	96872	4	9365	97151	4	9425	97428	4	9485	97704	5	9545	97978	5
9126	96028	5	9186	96313	5	9246	96595	4	9306	96876	5	9366	97155	5	9426	97433	5	9486	97708	4	9546	97982	4
9127	96033	5	9187	96317	5	9247	96600	5	9307	96881	5	9367	97160	5	9427	97437	4	9487	97713	5	9547	97987	5
9128	96038	4	9188	96322	5	9248	96605	4	9308	96886	4	9368	97165	4	9428	97442	5	9488	97717	4	9548	97991	4
9129	96042	5	9189	96327	5	9249	96609	5	9309	96890	5	9369	97169	5	9429	97447	5	9489	97722	5	9549	97996	5
9130	96047	5	9190	96332	5	9250	96614	5	9310	96895	5	9370	97174	5	9430	97451	4	9490	97727	4	9550	98000	4
9131	96052	5	9191	96336	4	9251	96619	5	9311	96900	5	9371	97179	5	9431	97456	5	9491	97731	5	9551	98005	5
9132	96057	5	9192	96341	5	9252	96624	5	9312	96904	4	9372	97183	4	9432	97460	4	9492	97736	4	9552	98009	4
9133	96061	4	9193	96346	5	9253	96628	4	9313	96909	5	9373	97188	5	9433	97465	5	9493	97740	5	9553	98014	5
9134	96066	5	9194	96350	5	9254	96633	5	9314	96914	5	9374	97192	4	9434	97470	4	9494	97745	4	9553	98019	4
9135	96071	5	9195	96355	5	9255	96638	4	9315	96918	5	9375	97197	5	9435	97474	5	9495	97749	5	9555	98023	5
9136	96076	4	9196	96360	5	9256	96642	5	9316	96923	5	9376	97202	4	9436	97479	4	9496	97754	5	9556	98028	4
9137	96080	5	9197	96365	4	9257	96647	5	9317	96928	5	9377	97206	5	9437	97483	5	9497	97759	4	9557	98032	5
9138	96085	5	9198	96369	5	9258	96652	4	9318	96932	4	9378	97211	5	9438	97488	5	9498	97763	5	9558	98037	4
9139	96090	5	9199	96374	5	9259	96656	5	9319	96937	5	9379	97216	5	9439	97493	4	9499	97768	4	9559	98041	5
9140	96095	4	9200	96379	5	9260	96661	5	9320	96942	5	9380	97220	4	9440	97497	5	9500	97772	5	9560	98046	4
9141	96099	5	9201	96384	5	9261	96666	4	9321	96946	4	9381	97225	5	9441	97502	5	9501	97777	4	9561	98050	5
9142	96104	5	9202	96388	4	9262	96670	5	9322	96951	5	9382	97230	5	9442	97506	4	9502	97782	5	9562	98055	4
9143	96109	5	9203	96393	5	9263	96675	5	9323	96956	5	9383	97234	4	9443	97511	5	9503	97786	4	9563	98059	5
9144	96114	4	9204	96398	4	9264	96680	5	9324	96960	5	9384	97239	5	9444	97516	4	9504	97791	5	9564	98064	4
9145	96118	5	9205	96402	5	9265	96685	4	9325	96965	5	9385	97243	5	9445	97520	5	9505	97795	4	9565	98068	5
9146	96123	5	9206	96407	5	9266	96689	5	9326	96970	5	9386	97248	5	9446	97525	5	9506	97800	4	9566	98073	5
9147	96128	5	9207	96412	5	9267	96694	5	9327	96974	4	9387	97253	4	9447	97529	4	9507	97804	5	9567	98078	4
9148	96133	4	9208	96417	5	9268	96699	4	9328	96979	5	9388	97257	5	9448	97534	5	9508	97809	4	9568	98082	5
9149	96137	5	9209	96421	5	9269	96703	5	9329	96984	4	9389	97262	4	9449	97539	4	9509	97813	5	9569	98087	4
9150	96142	5	9210	96426	5	9270	96708	5	9330	96988	5	9390	97267	5	9450	97543	5	9510	97818	5	9570	98091	5
9151	96147	5	9211	96431	4	9271	96713	4	9331	96993	4	9391	97271	4	9451	97548	4	9511	97823	4	9571	98096	4
9152	96152	4	9212	96435	5	9272	96717	5	9332	96997	5	9392	97276	5	9452	97552	5	9512	97827	5	9572	98100	5
9153	96156	5	9213	96440	5	9273	96722	5	9333	97002	5	9393	97280	4	9453	97557	4	9513	97832	4	9573	98105	4
9154	96161	5	9214	96445	5	9274	96727	5	9334	97007	4	9394	97285	5	9454	97562	5	9514	97836	5	9574	98109	5
9155	96166	5	9215	96450	4	9275	96731	5	9335	97011	5	9395	97290	4	9455	97566	4	9515	97841	4	9575	98114	4
9156	96171	4	9216	96454	5	9276	96736	5	9336	97016	5	9396	97294	5	9456	97571	5	9516	97845	5	9576	98118	5
9157	96175	5	9217	96459	5	9277	96741	5	9337	97021	4	9397	97299	5	9457	97575	4	9517	97850	5	9577	98123	5
9158	96180	5	9218	96464	5	9278	96745	4	9338	97025	5	9398	97304	4	9458	97580	5	9518	97855	4	9578	98127	4
9159	96185	5	9219	96468	4	9279	96750	5	9339	97030	5	9399	97308	5	9459	97585	4	9519	97859	5	9579	98132	5
9160	96190	4	9220	96473	5	9280	96755	5	9340	97035	4	9400	97313	4	9460	97589	4	9520	97864	4	9580	98137	4
9161	96194	5	9221	96478	5	9281	96759	5	9341	97039	5	9401	97317	5	9461	97594	5	9521	97868	5	9581	98141	5
9162	96199	5	9222	96483	4	9282	96764	5	9342	97044	5	9402	97322	4	9462	97598	4	9522	97873	4	9582	98146	4
9163	96204	5	9223	96487	5	9283	96769	5	9343	97049	4	9403	97327	4	9463	97603	5	9523	97877	5	9583	98150	5
9164	96209	4	9224	96492	4	9284	96774	5	9344	97053	4	9404	97331	5	9464	97606	4	9524	97882	5	9584	98155	4
9165	96213	5	9225	96497	5	9285	96778	4	9345	97058	5	9405	97336	5	9465	97612	5	9525	97886	4	9585	98159	5
9166	96218	5	9226	96501	4	9286	96783	5	9346	97063	4	9406	97340	5	9466	97617	4	9526	97891	5	9586	98164	4
9167	96223	4	9227	96506	5	9287	96788	4	9347	97067	5	9407	97345	5	9467	97621	5	9527	97896	4	9587	98168	5
9168	96227	5	9228	96511	4	9288	96792	5	9348	97072	5	9408	97350	4	9468	97626	4	9528	97900	5	9588	98173	4
9169	96232	5	9229	96515	5	9289	96797	5	9349	97077	4	9409	97354	5	9469	97630	5	9529	97905	4	9589	98177	5
9170	96237	5	9230	96520	5	9290	96802	4	9350	97081	5	9410	97359	5	9470	97635	5	9530	97909	5	9590	98182	4
9171	96242	4	9231	96525	5	9291	96806	5	9351	97086	4	9411	97364	4	9471	97640	4	9531	97914	4	9591	98186	5
9172	96246	5	9232	96530	4	9292	96811	5	9352	97090	5	9412	97368	5	9472	97644	5	9532	97918	5	9592	98191	4
9173	96251	5	9233	96534	5	9293	96816	4	9353	97095	4	9413	97373	4	9473	97649	4	9533	97923	4	9593	98195	5
9174	96256	5	9234	96539	5	9294	96820	5	9354	97100	5	9414	97377	4	9474	97653	5	9534	97928	5	9594	98200	4
9175	96261	4	9235	96544	4	9295	96825	4	9355	97104	5	9415	97382	5	9475	97658	5	9535	97932	5	9595	98204	5
9176	96265	5	9236	96548	5	9296	96830	5	9356	97109	4	9416	97387	5	9476	97663	4	9536	97937	4	9596	98209	5
9177	96270	5	9237	96553	5	9297	96834	5	9357	97114	5	9417	97391	4	9477	97667	5	9537	97941	5	9597	98214	4
9178	96275	5	9238	96558	5	9298	96839	4	9358	97118	5	9418	97396	5	9478	97672	4	9538	97946	4	9598	98218	5
9179	96280	5	9239	96562	4	9299	96844	5	9359	97123	4	9419	97400	5	9479	97676	5	9539	97950	5	9599	98223	4
9180	96284		9240	96567		9300	96848		9360	97128		9420	97405		9480	97681		9540	97955		9600	98227	

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9601	98232	5	9651	98457	4	9701	98682	5	9751	98905	5	9801	99127	4	9851	99348	4	9901	99568	4	9951	99787	5
9602	98236	4	9652	98462	5	9702	98686	4	9752	98909	4	9802	99131	4	9852	99352	4	9902	99572	4	9952	99791	4
9603	98241	5	9653	98466	4	9703	98691	5	9753	98914	5	9803	99136	5	9853	99357	5	9903	99577	5	9953	99795	4
9604	98245	4	9654	98471	5	9704	98695	4	9754	98918	4	9804	99140	4	9854	99361	4	9904	99581	4	9954	99800	5
9605	98250	5	9655	98475	4	9705	98700	5	9755	98923	5	9805	99145	5	9855	99366	5	9905	99585	4	9955	99804	4
9606	98254	4	9656	98480	5	9706	98704	4	9756	98927	4	9806	99149	4	9856	99370	4	9906	99590	5	9956	99808	4
9607	98259	5	9657	98484	4	9707	98709	5	9757	98932	5	9807	99154	5	9857	99374	4	9907	99594	4	9957	99813	5
9608	98263	4	9658	98489	5	9708	98713	4	9758	98936	4	9808	99158	4	9858	99379	5	9908	99599	5	9958	99817	4
9609	98268	5	9659	98493	4	9709	98717	5	9759	98941	5	9809	99162	4	9859	99383	4	9909	99603	4	9959	99822	5
9610	98272	4	9660	98498	5	9710	98722	4	9760	98945	4	9810	99167	5	9860	99388	5	9910	99607	4	9960	99826	4
9611	98277	5	9661	98502	4	9711	98726	5	9761	98949	5	9811	99171	4	9861	99392	4	9911	99612	5	9961	99830	4
9612	98281	4	9662	98507	5	9712	98731	4	9762	98954	4	9812	99176	5	9862	99396	4	9912	99616	4	9962	99835	5
9613	98286	5	9663	98511	4	9713	98735	5	9763	98958	5	9813	99180	4	9863	99401	5	9913	99621	5	9963	99839	4
9614	98290	4	9664	98516	5	9714	98740	4	9764	98963	4	9814	99185	5	9864	99405	4	9914	99625	4	9964	99843	5
9615	98295	5	9665	98520	4	9715	98744	5	9765	98967	5	9815	99189	4	9865	99410	5	9915	99629	5	9965	99848	4
9616	98299	4	9666	98525	5	9716	98749	4	9766	98972	4	9816	99193	4	9866	99414	4	9916	99634	4	9966	99852	4
9617	98304	5	9667	98529	4	9717	98753	5	9767	98976	5	9817	99198	5	9867	99419	5	9917	99638	4	9967	99856	4
9618	98308	4	9668	98534	5	9718	98758	4	9768	98981	4	9818	99202	4	9868	99423	4	9918	99642	4	9968	99861	5
9619	98313	5	9669	98538	4	9719	98762	5	9769	98985	5	9819	99207	5	9869	99427	4	9919	99647	5	9969	99865	4
9620	98318	5	9670	98543	5	9720	98767	4	9770	98989	4	9820	99211	4	9870	99432	5	9920	99651	4	9970	99870	5
9621	98322	4	9671	98547	4	9721	98771	5	9771	98994	5	9821	99216	5	9871	99436	4	9921	99656	5	9971	99874	4
9622	98327	5	9672	98552	5	9722	98776	4	9772	98998	4	9822	99220	4	9872	99441	4	9922	99660	4	9972	99878	4
9623	98331	4	9673	98556	4	9723	98780	4	9773	99003	4	9823	99224	4	9873	99445	5	9923	99664	4	9973	99883	5
9624	98336	5	9674	98561	5	9724	98784	4	9774	99007	5	9824	99229	5	9874	99449	4	9924	99669	5	9974	99887	4
9625	98340	4	9675	98565	4	9725	98789	5	9775	99012	4	9825	99233	4	9875	99454	5	9925	99673	4	9975	99891	4
9626	98345	5	9676	98570	4	9726	98793	4	9776	99016	5	9826	99238	5	9876	99458	4	9926	99677	5	9976	99896	4
9627	98349	4	9677	98574	5	9727	98798	4	9777	99021	4	9827	99242	4	9877	99463	5	9927	99682	4	9977	99900	4
9628	98354	5	9678	98579	4	9728	98802	5	9778	99025	4	9828	99247	4	9878	99467	4	9928	99686	4	9978	99904	5
9629	98358	4	9679	98583	5	9729	98807	4	9779	99029	4	9829	99251	5	9879	99471	4	9929	99691	5	9979	99909	4
9630	98363	5	9680	98588	4	9730	98811	4	9780	99034	5	9830	99255	4	9880	99476	5	9930	99695	4	9980	99913	4
9631	98367	4	9681	98592	5	9731	98816	5	9781	99038	4	9831	99260	5	9881	99480	4	9931	99699	4	9981	99917	5
9632	98372	5	9682	98597	4	9732	98820	4	9782	99043	5	9832	99264	4	9882	99484	5	9932	99704	4	9982	99922	4
9633	98376	4	9683	98601	5	9733	98825	4	9783	99047	4	9833	99269	5	9883	99489	4	9933	99708	4	9983	99926	4
9634	98381	5	9684	98605	4	9734	98829	5	9784	99052	5	9834	99273	4	9884	99493	4	9934	99712	5	9984	99930	5
9635	98385	4	9685	98610	5	9735	98834	4	9785	99056	4	9835	99277	5	9885	99498	5	9935	99717	4	9985	99935	4
9636	98390	5	9686	98614	4	9736	98838	5	9786	99061	5	9836	99282	4	9886	99502	4	9936	99721	5	9986	99939	5
9637	98394	4	9687	98619	5	9737	98843	4	9787	99065	4	9837	99286	4	9887	99506	5	9937	99726	4	9987	99944	4
9638	98399	5	9688	98623	4	9738	98847	4	9788	99069	4	9838	99291	5	9888	99511	4	9938	99730	4	9988	99948	4
9639	98403	4	9689	98628	5	9739	98851	5	9789	99074	5	9839	99295	4	9889	99515	5	9939	99734	5	9989	99952	5
9640	98408	5	9690	98632	4	9740	98856	4	9790	99078	4	9840	99300	5	9890	99520	4	9940	99739	4	9990	99957	4
9641	98412	4	9691	98637	5	9741	98860	4	9791	99083	5	9841	99304	4	9891	99524	4	9941	99743	4	9991	99961	4
9642	98417	5	9692	98641	4	9742	98865	5	9792	99087	4	9842	99308	5	9892	99528	5	9942	99747	5	9992	99965	5
9643	98421	4	9693	98646	5	9743	98869	4	9793	99092	5	9843	99313	4	9893	99533	4	9943	99752	4	9993	99970	4
9644	98426	5	9694	98650	4	9744	98874	5	9794	99096	4	9844	99317	4	9894	99537	5	9944	99756	5	9994	99974	4
9645	98430	4	9695	98655	5	9745	98878	4	9795	99100	5	9845	99322	5	9895	99542	4	9945	99760	4	9995	99978	5
9646	98435	5	9696	98659	4	9746	98883	5	9796	99105	4	9846	99326	4	9896	99546	4	9946	99765	5	9996	99983	4
9647	98439	4	9697	98664	5	9747	98887	4	9797	99109	5	9847	99330	5	9897	99550	4	9947	99769	4	9997	99987	4
9648	98444	5	9698	98668	4	9748	98892	5	9798	99114	4	9848	99335	4	9898	99555	5	9948	99774	5	9998	99991	5
9649	98448	4	9699	98673	5	9749	98896	4	9799	99118	4	9849	99339	5	9899	99559	4	9949	99778	4	9999	99996	4
9650	98453	5	9700	98677	4	9750	98900	4	9800	99123	4	9850	99344	5	9900	99564	5	9950	99782	5	10000	00000	4

0 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	*Inf. neg.*		*Inf. neg.*		*Inf. posit.*	0.00000	60
1	6.46373	30103	6.46373	30103	13.53627	0.00000	59
2	6.76476	17609	6.76476	17609	13.23524	0.00000	58
3	6.94085	12494	6.94085	12494	13.05915	0.00000	57
4	7.06579	9691	7.06579	9691	12.93421	0.00000	56
5	7.16270	7918	7.16270	7918	12.83730	0.00000	55
6	7.24188	6694	7.24188	6694	12.75812	0.00000	54
7	7.30882	5800	7.30882	5800	12.69118	0.00000	53
8	7.36682	5115	7.36682	5115	12.63318	0.00000	52
9	7.41797	4576	7.41797	4576	12.58203	0.00000	51
10	7.46373	4139	7.46373	4139	12.53627	0.00000	50
11	7.50512	3779	7.50512	3779	12.49488	0.00000	49
12	7.54291	3476	7.54291	3476	12.45709	0.00000	48
13	7.57767	3218	7.57767	3219	12.42233	0.00000	47
14	7.60985	2997	7.60986	2996	12.39014	0.00000	46
15	7.63982	2802	7.63982	2803	12.36018	0.00000	45
16	7.66784	2633	7.66785	2633	12.33215	0.00000	44
17	7.69417	2483	7.69418	2482	12.30582	9.99999	43
18	7.71900	2348	7.71900	2348	12.28100	9.99999	42
19	7.74248	2227	7.74248	2228	12.25752	9.99999	41
20	7.76475	2119	7.76476	2119	12.23524	9.99999	40
21	7.78594	2021	7.78595	2020	12.21405	9.99999	39
22	7.80615	1930	7.80615	1931	12.19385	9.99999	38
23	7.82545	1848	7.82546	1848	12.17454	9.99999	37
24	7.84393	1773	7.84394	1773	12.15606	9.99999	36
25	7.86166	1704	7.86167	1704	12.13833	9.99999	35
26	7.87870	1639	7.87871	1639	12.12129	9.99999	34
27	7.89509	1579	7.89510	1579	12.10490	9.99999	33
28	7.91088	1524	7.91089	1524	12.08911	9.99999	32
29	7.92612	1472	7.92613	1473	12.07387	9.99998	31
30	7.94084	1424	7.94086	1424	12.05914	9.99998	30
31	7.95508	1379	7.95510	1379	12.04490	9.99998	29
32	7.96887	1336	7.96889	1336	12.03111	9.99998	28
33	7.98223	1297	7.98225	1297	12.01775	9.99998	27
34	7.99520	1259	7.99522	1259	12.00478	9.99998	26
35	8.00779	1223	8.00781	1223	11.99219	9.99998	25
36	8.02002	1190	8.02004	1190	11.97996	9.99998	24
37	8.03192	1158	8.03194	1159	11.96806	9.99997	23
38	8.04350	1128	8.04353	1128	11.95647	9.99997	22
39	8.05478	1100	8.05481	1100	11.94519	9.99997	21
40	8.06578	1072	8.06581	1072	11.93419	9.99997	20
41	8.07650	1046	8.07653	1047	11.92347	9.99997	19
42	8.08696	1022	8.08700	1022	11.91300	9.99997	18
43	8.09718	998	8.09722	998	11.90278	9.99997	17
44	8.10717	976	8.10720	976	11.89280	9.99996	16
45	8.11693	954	8.11696	955	11.88304	9.99996	15
46	8.12647	934	8.12651	934	11.87349	9.99996	14
47	8.13581	914	8.13585	915	11.86415	9.99996	13
48	8.14495	896	8.14500	895	11.85500	9.99996	12
49	8.15391	877	8.15395	878	11.84605	9.99996	11
50	8.16268	860	8.16273	860	11.83727	9.99995	10
51	8.17128	843	8.17133	843	11.82867	9.99995	9
52	8.17971	827	8.17976	828	11.82024	9.99995	8
53	8.18798	812	8.18804	812	11.81196	9.99995	7
54	8.19610	797	8.19616	797	11.80383	9.99995	6
55	8.20407	782	8.20413	782	11.79587	9.99994	5
56	8.21189	769	8.21195	769	11.78805	9.99994	4
57	8.21958	755	8.21964	756	11.78036	9.99994	3
58	8.22713	743	8.22720	742	11.77280	9.99994	2
59	8.23456	730	8.23462	730	11.76538	9.99994	1
60	8.24186		8.24192		11.75808	9.99993	0
	Cos.		Cot.		Tang.	Sin.	

89 Degrees.

1 Degree.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	8.24186	717	8.24192	718	11.75808	9.99993	60
1	8.24903	706	8.24910	706	11.75090	9.99993	59
2	8.25609	695	8.25616	696	11.74383	9.99993	58
3	8.26304	684	8.26312	684	11.73688	9.99993	57
4	8.26988	673	8.26996	673	11.73004	9.99992	56
5	8.27661	663	8.27669	663	11.72331	9.99992	55
6	8.28324	653	8.28332	654	11.71668	9.99992	54
7	8.28977	644	8.28986	643	11.71014	9.99992	53
8	8.29621	634	8.29629	634	11.70371	9.99992	52
9	8.30255	624	8.30263	625	11.69737	9.99991	51
10	8.30879	616	8.30888	617	11.69112	9.99991	50
11	8.31495	608	8.31505	607	11.68495	9.99991	49
12	8.32103	599	8.32112	599	11.67888	9.99990	48
13	8.32702	590	8.32711	591	11.67289	9.99990	47
14	8.33292	583	8.33302	584	11.66698	9.99990	46
15	8.33875	575	8.33886	575	11.66114	9.99990	45
16	8.34450	568	8.34461	568	11.65539	9.99989	44
17	8.35018	560	8.35029	561	11.64971	9.99989	43
18	8.35578	553	8.35590	553	11.64410	9.99989	42
19	8.36131	547	8.36143	546	11.63857	9.99989	41
20	8.36678	539	8.36689	540	11.63311	9.99988	40
21	8.37217	533	8.37229	533	11.62771	9.99988	39
22	8.37750	526	8.37762	527	11.62238	9.99988	38
23	8.38276	520	8.38289	520	11.61711	9.99987	37
24	8.38796	514	8.38809	514	11.61191	9.99987	36
25	8.39310	508	8.39323	509	11.60677	9.99987	35
26	8.39818	502	8.39832	502	11.60168	9.99986	34
27	8.40320	496	8.40334	496	11.59666	9.99986	33
28	8.40816	491	8.40830	491	11.59170	9.99986	32
29	8.41307	485	8.41321	486	11.58679	9.99985	31
30	8.41792	480	8.41807	480	11.58193	9.99985	30
31	8.42272	474	8.42287	475	11.57713	9.99985	29
32	8.42746	470	8.42762	470	11.57238	9.99984	28
33	8.43216	464	8.43232	464	11.56768	9.99984	27
34	8.43680	459	8.43696	460	11.56304	9.99984	26
35	8.44139	455	8.44156	455	11.55844	9.99983	25
36	8.44594	450	8.44611	450	11.55389	9.99983	24
37	8.45044	445	8.45061	446	11.54939	9.99983	23
38	8.45489	441	8.45507	441	11.54493	9.99982	22
39	8.45930	436	8.45948	437	11.54052	9.99982	21
40	8.46366	433	8.46385	432	11.53615	9.99982	20
41	8.46799	427	8.46817	428	11.53183	9.99981	19
42	8.47226	424	8.47245	424	11.52755	9.99981	18
43	8.47650	419	8.47669	420	11.52331	9.99981	17
44	8.48069	416	8.48089	416	11.51911	9.99980	16
45	8.48485	411	8.48505	412	11.51495	9.99980	15
46	8.48896	408	8.48917	408	11.51083	9.99979	14
47	8.49304	404	8.49325	404	11.50675	9.99979	13
48	8.49708	400	8.49729	401	11.50271	9.99979	12
49	8.50108	396	8.50130	397	11.49870	9.99978	11
50	8.50504	393	8.50527	393	11.49473	9.99978	10
51	8.50897	390	8.50920	390	11.49080	9.99977	9
52	8.51287	386	8.51310	386	11.48690	9.99977	8
53	8.51673	382	8.51696	383	11.48304	9.99977	7
54	8.52055	379	8.52079	380	11.47921	9.99976	6
55	8.52434	376	8.52459	376	11.47541	9.99976	5
56	8.52810	373	8.52835	373	11.47165	9.99975	4
57	8.53183	369	8.53208	370	11.46792	9.99975	3
58	8.53552	367	8.53578	367	11.46422	9.99974	2
59	8.53919	363	8.53945	363	11.46055	9.99974	1
60	8.54282		8.54308		11.45692	9.99974	0
	Cos.		Cot.		Tang.	Sin.	

88 Degrees.

2 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	8.54282	360	8.54308	361	11.45692	9.99974	60
1	8.54642	357	8.54669	358	11.45331	9.99973	59
2	8.54999	355	8.55027	355	11.44973	9.99973	58
3	8.55354	351	8.55382	352	11.44618	9.99972	57
4	8.55705	349	8.55734	349	11.44266	9.99972	56
5	8.56054	346	8.56083	346	11.43917	9.99971	55
6	8.56400	343	8.56429	344	11.43571	9.99971	54
7	8.56743	341	8.56773	341	11.43227	9.99970	53
8	8.57084	337	8.57114	338	11.42886	9.99970	52
9	8.57421	336	8.57452	336	11.42548	9.99969	51
10	8.57757	332	8.57788	333	11.42212	9.99969	50
11	8.58089	330	8.58121	330	11.41879	9.99968	49
12	8.58419	328	8.58451	328	11.41549	9.99968	48
13	8.58747	325	8.58779	326	11.41221	9.99967	47
14	8.59072	323	8.59105	323	11.40895	9.99967	46
15	8.59395	320	8.59428	321	11.40572	9.99967	45
16	8.59715	318	8.59749	319	11.40251	9.99966	44
17	8.60033	316	8.60068	316	11.39932	9.99966	43
18	8.60349	313	8.60384	314	11.39616	9.99965	42
19	8.60662	311	8.60698	311	11.39302	9.99964	41
20	8.60973	309	8.61009	310	11.38991	9.99964	40
21	8.61282	307	8.61319	307	11.38681	9.99963	39
22	8.61589	305	8.61626	305	11.38374	9.99963	38
23	8.61894	302	8.61931	303	11.38069	9.99962	37
24	8.62196	301	8.62234	301	11.37766	9.99962	36
25	8.62497	298	8.62535	299	11.37465	9.99961	35
26	8.62795	296	8.62834	297	11.37166	9.99961	34
27	8.63091	294	8.63131	295	11.36869	9.99960	33
28	8.63385	293	8.63426	292	11.36574	9.99960	32
29	8.63678	290	8.63718	291	11.36282	9.99959	31
30	8.63968	288	8.64009	289	11.35991	9.99959	30
31	8.64256	287	8.64298	287	11.35702	9.99958	29
32	8.64543	284	8.64585	285	11.35415	9.99958	28
33	8.64827	283	8.64870	284	11.35130	9.99957	27
34	8.65110	281	8.65154	281	11.34846	9.99956	26
35	8.65391	279	8.65435	280	11.34565	9.99956	25
36	8.65670	277	8.65715	278	11.34285	9.99955	24
37	8.65947	276	8.65993	276	11.34007	9.99955	23
38	8.66223	274	8.66269	274	11.33731	9.99954	22
39	8.66497	272	8.66543	273	11.33457	9.99954	21
40	8.66769	270	8.66816	271	11.33184	9.99953	20
41	8.67039	269	8.67087	269	11.32913	9.99952	19
42	8.67308	267	8.67356	268	11.32644	9.99952	18
43	8.67575	266	8.67624	266	11.32376	9.99951	17
44	8.67841	263	8.67890	264	11.32110	9.99951	16
45	8.68104	263	8.68154	263	11.31846	9.99950	15
46	8.68367	260	8.68417	261	11.31583	9.99949	14
47	8.68627	259	8.68678	260	11.31322	9.99949	13
48	8.68886	258	8.68938	258	11.31062	9.99948	12
49	8.69144	256	8.69196	257	11.30804	9.99948	11
50	8.69400	254	8.69453	255	11.30547	9.99947	10
51	8.69654	253	8.69708	254	11.30292	9.99946	9
52	8.69907	252	8.69962	252	11.30038	9.99946	8
53	8.70159	250	8.70214	251	11.29786	9.99945	7
54	8.70409	249	8.70465	249	11.29535	9.99944	6
55	8.70658	247	8.70714	248	11.29286	9.99944	5
56	8.70905	246	8.70962	246	11.29038	9.99943	4
57	8.71151	244	8.71208	245	11.28792	9.99942	3
58	8.71395	243	8.71453	244	11.28547	9.99942	2
59	8.71638	242	8.71697	243	11.28303	9.99941	1
60	8.71880		8.71940		11.28060	9.99940	0
	Cos.		Cot.		Tang.	Sin.	

87 Degrees.

3 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	8.71880	240	8.71940	241	11.28060	9.99940	60
1	8.72120	239	8.72181	239	11.27819	9.99940	59
2	8.72359	238	8.72420	239	11.27580	9.99939	58
3	8.72597	237	8.72659	237	11.27341	9.99938	57
4	8.72834	235	8.72896	236	11.27104	9.99938	56
5	8.73069	234	8.73132	234	11.26868	9.99937	55
6	8.73303	232	8.73366	234	11.26634	9.99936	54
7	8.73535	232	8.73600	232	11.26400	9.99936	53
8	8.73767	230	8.73832	231	11.26168	9.99935	52
9	8.73997	229	8.74063	229	11.25937	9.99934	51
10	8.74226	228	8.74292	229	11.25708	9.99934	50
11	8.74454	226	8.74521	227	11.25479	9.99933	49
12	8.74680	226	8.74748	226	11.25252	9.99932	48
13	8.74906	224	8.74974	225	11.25026	9.99932	47
14	8.75130	223	8.75199	224	11.24801	9.99931	46
15	8.75353	222	8.75423	222	11.24577	9.99930	45
16	8.75575	220	8.75645	222	11.24355	9.99929	44
17	8.75795	220	8.75867	220	11.24133	9.99929	43
18	8.76015	219	8.76087	219	11.23913	9.99928	42
19	8.76234	217	8.76306	219	11.23694	9.99927	41
20	8.76451	216	8.76525	217	11.23475	9.99926	40
21	8.76667	216	8.76742	216	11.23258	9.99926	39
22	8.76883	214	8.76958	215	11.23042	9.99925	38
23	8.77097	213	8.77173	214	11.22827	9.99924	37
24	8.77310	212	8.77387	213	11.22613	9.99923	36
25	8.77522	211	8.77600	211	11.22400	9.99923	35
26	8.77733	210	8.77811	211	11.22189	9.99922	34
27	8.77943	209	8.78022	210	11.21978	9.99921	33
28	8.78152	208	8.78232	209	11.21768	9.99920	32
29	8.78360	208	8.78441	208	11.21559	9.99920	31
30	8.78568	206	8.78649	206	11.21351	9.99919	30
31	8.78774	205	8.78855	206	11.21145	9.99918	29
32	8.78979	204	8.79061	205	11.20939	9.99917	28
33	8.79183	203	8.79266	204	11.20734	9.99917	27
34	8.79386	202	8.79470	203	11.20530	9.99916	26
35	8.79588	201	8.79673	202	11.20327	9.99915	25
36	8.79789	201	8.79875	201	11.20125	9.99914	24
37	8.79990	199	8.80076	201	11.19924	9.99913	23
38	8.80189	199	8.80277	199	11.19723	9.99913	22
39	8.80388	197	8.80476	198	11.19524	9.99912	21
40	8.80585	197	8.80674	198	11.19326	9.99911	20
41	8.80782	196	8.80872	196	11.19128	9.99910	19
42	8.80978	195	8.81068	196	11.18932	9.99909	18
43	8.81173	194	8.81264	195	11.18736	9.99909	17
44	8.81367	193	8.81459	194	11.18541	9.99908	16
45	8.81560	192	8.81653	193	11.18347	9.99907	15
46	8.81752	192	8.81846	192	11.18154	9.99906	14
47	8.81944	190	8.82038	192	11.17962	9.99905	13
48	8.82134	190	8.82230	190	11.17770	9.99904	12
49	8.82324	189	8.82420	190	11.17580	9.99904	11
50	8.82513	188	8.82610	189	11.17390	9.99903	10
51	8.82701	187	8.82799	188	11.17201	9.99902	9
52	8.82888	187	8.82987	188	11.17013	9.99901	8
53	8.83075	186	8.83175	186	11.16825	9.99900	7
54	8.83261	185	8.83361	186	11.16639	9.99899	6
55	8.83446	184	8.83547	185	11.16453	9.99898	5
56	8.83630	183	8.83732	184	11.16268	9.99898	4
57	8.83813	183	8.83916	184	11.16084	9.99897	3
58	8.83996	181	8.84100	182	11.15900	9.99896	2
59	8.84177	181	8.84282	182	11.15718	9.99895	1
60	8.84358		8.84464		11.15536	9.99894	0
	Cos.		Cot.		Tang.	Sin.	

86 Degrees.

4 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	8.84358	181	8.84464	182	11.15536	9.99894	60
1	8.84539	179	8.84646	180	11.15354	9.99893	59
2	8.84718	179	8.84826	180	11.15174	9.99892	58
3	8.84897	178	8.85006	179	11.14994	9.99891	57
4	8.85075	177	8.85185	178	11.14815	9.99891	56
5	8.85252	177	8.85363	177	11.14637	9.99890	55
6	8.85429	176	8.85540	177	11.14460	9.99889	54
7	8.85605	175	8.85717	176	11.14283	9.99888	53
8	8.85780	175	8.85893	176	11.14107	9.99887	52
9	8.85955	173	8.86069	174	11.13931	9.99886	51
10	8.86128	173	8.86243	174	11.13757	9.99885	50
11	8.86301	173	8.86417	174	11.13583	9.99884	49
12	8.86474	171	8.86591	172	11.13409	9.99883	48
13	8.86645	171	8.86763	172	11.13237	9.99882	47
14	8.86816	171	8.86935	171	11.13065	9.99881	46
15	8.86987	169	8.87106	171	11.12894	9.99880	45
16	8.87156	169	8.87277	170	11.12723	9.99879	44
17	8.87325	169	8.87447	169	11.12553	9.99879	43
18	8.87494	167	8.87616	169	11.12384	9.99878	42
19	8.87661	168	8.87785	168	11.12215	9.99877	41
20	8.87829	166	8.87953	167	11.12047	9.99876	40
21	8.87995	166	8.88120	167	11.11880	9.99875	39
22	8.88161	165	8.88287	166	11.11713	9.99874	38
23	8.88326	164	8.88453	165	11.11547	9.99873	37
24	8.88490	164	8.88618	165	11.11382	9.99872	36
25	8.88654	163	8.88783	165	11.11217	9.99871	35
26	8.88817	163	8.88948	163	11.11052	9.99870	34
27	8.88980	162	8.89111	163	11.10889	9.99869	33
28	8.89142	162	8.89274	163	11.10726	9.99868	32
29	8.89304	160	8.89437	161	11.10563	9.99867	31
30	8.89464	161	8.89598	162	11.10402	9.99866	30
31	8.89625	159	8.89760	160	11.10240	9.99865	29
32	8.89784	159	8.89920	160	11.10080	9.99864	28
33	8.89943	159	8.90080	160	11.09920	9.99863	27
34	8.90102	158	8.90240	159	11.09760	9.99862	26
35	8.90260	157	8.90399	158	11.09601	9.99861	25
36	8.90417	157	8.90557	158	11.09443	9.99860	24
37	8.90574	156	8.90715	157	11.09285	9.99859	23
38	8.90730	155	8.90872	157	11.09128	9.99858	22
39	8.90885	155	8.91029	156	11.08971	9.99857	21
40	8.91040	155	8.91185	155	11.08815	9.99856	20
41	8.91195	154	8.91340	155	11.08660	9.99855	19
42	8.91349	153	8.91495	155	11.08505	9.99854	18
43	8.91502	153	8.91650	153	11.08350	9.99853	17
44	8.91655	152	8.91803	154	11.08197	9.99852	16
45	8.91807	152	8.91957	153	11.08043	9.99851	15
46	8.91959	151	8.92110	152	11.07890	9.99850	14
47	8.92110	151	8.92262	152	11.07738	9.99848	13
48	8.92261	150	8.92414	151	11.07586	9.99847	12
49	8.92411	150	8.92565	151	11.07435	9.99846	11
50	8.92561	149	8.92716	150	11.07284	9.99845	10
51	8.92710	149	8.92866	150	11.07134	9.99844	9
52	8.92859	148	8.93016	149	11.06984	9.99843	8
53	8.93007	147	8.93165	148	11.06835	9.99842	7
54	8.93154	147	8.93313	149	11.06687	9.99841	6
55	8.93301	147	8.93462	147	11.06538	9.99840	5
56	8.93448	146	8.93609	147	11.06391	9.99839	4
57	8.93594	146	8.93756	147	11.06244	9.99838	3
58	8.93740	145	8.93903	146	11.06097	9.99837	2
59	8.93885	145	8.94049	146	11.05951	9.99836	1
60	8.94030		8.94195		11.05805	9.99834	0
	Cof.		Cot.		Tang.	Sin.	

85 Degrees.

5 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	8.94030	144	8.94195	145	11.05805	9.99834	60
1	8.94174	143	8.94340	145	11.05660	9.99833	59
2	8.94317	144	8.94485	145	11.05515	9.99832	58
3	8.94461	142	8.94630	143	11.05370	9.99831	57
4	8.94603	143	8.94773	144	11.05227	9.99830	56
5	8.94746	141	8.94917	143	11.05083	9.99829	55
6	8.94887	142	8.95060	142	11.04940	9.99828	54
7	8.95029	141	8.95202	142	11.04798	9.99827	53
8	8.95170	140	8.95344	142	11.04656	9.99825	52
9	8.95310	140	8.95486	141	11.04514	9.96824	51
10	8.95450	139	8.95627	140	11.04373	9.99823	50
11	8.95589	139	8.95767	141	11.04233	9.99822	49
12	8.95728	139	8.95908	139	11.04092	9.99821	48
13	8.95867	138	8.96047	140	11.03953	9.99820	47
14	8.96005	138	8.96187	138	11.03813	9.99819	46
15	8.96143	137	8.96325	139	11.03675	9.99817	45
16	8.96280	137	8.96464	138	11.03536	9.99816	44
17	8.96417	136	8.96602	137	11.03398	9.99815	43
18	8.96553	136	8.96739	138	11.03261	9.99814	42
19	8.96689	136	8.96877	136	11.03123	9.99813	41
20	8.96825	135	8.97013	137	11.02987	9.99812	40
21	8.96960	135	8.97150	135	11.02850	9.99810	39
22	8.97095	134	8.97285	136	11.02715	9.99809	38
23	8.97229	134	8.97421	135	11.02579	9.99808	37
24	8.97363	133	8.97556	135	11.02444	9.99807	36
25	8.97496	133	8.97691	134	11.02309	9.99806	35
26	8.97629	133	8.97825	134	11.02175	9.99804	34
27	8.97762	132	8.97959	133	11.02041	9.99803	33
28	8.97894	132	8.98092	133	11.01908	9.99802	32
29	8.98026	131	8.98225	133	11.01775	9.99801	31
30	8.98157	131	8.98358	132	11.01642	9.99800	30
31	8.98288	131	8.98490	132	11.01510	9.99798	29
32	8.98419	130	8.98622	131	11.01378	9.99797	28
33	8.98549	130	8.98753	131	11.01247	9.99796	27
34	8.98679	129	8.98884	131	11.01116	9.99795	26
35	8.98808	129	8.99015	130	11.00985	9.99793	25
36	8.98937	129	8.99145	130	11.00855	9.99792	24
37	8.99066	128	8.99275	130	11.00725	9.99791	23
38	8.99194	128	8.99405	129	11.00595	9.99790	22
39	8.99322	128	8.99534	128	11.00466	9.99788	21
40	8.99450	127	8.99662	129	11.00338	9.99787	20
41	8.99577	127	8.99791	128	11.00209	9.99786	19
42	8.99704	126	8.99919	127	11.00081	9.99785	18
43	8.99830	126	9.00046	128	10.99954	9.99783	17
44	8.99956	126	9.00174	127	10.99826	9.99782	16
45	9.00082	125	9.00301	126	10.99699	9.99781	15
46	9.00207	125	9.00427	126	10.99573	9.99780	14
47	9.00332	124	9.00553	126	10.99447	9.99778	13
48	9.00456	125	9.00679	126	10.99321	9.99777	12
49	9.00581	123	9.00805	125	10.99195	9.99776	11
50	9.00704	124	9.00930	125	10.99070	9.99775	10
51	9.00828	123	9.01055	124	10.98945	9.99773	9
52	9.00951	123	9.01179	124	10.98821	9.99772	8
53	9.01074	122	9.01303	124	10.98697	9.99771	7
54	9.01196	122	9.01427	123	10.98573	9.99769	6
55	9.01318	122	9.01550	123	10.98450	9.99768	5
56	9.01440	121	9.01673	123	10.98327	9.99767	4
57	9.01561	121	9.01796	122	10.98204	9.99765	3
58	9.01682	121	9.01918	122	10.98082	9.99764	2
59	9.01803	120	9.02040	122	10.97960	9.99763	1
60	9.01923		9.02162		10.97838	9.99761	0
	Cof.		Cot.		Tang.	Sin.	

84 Degrees.

6 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	9.01923	120	9.02162	121	10.97838	9.99761	60
1	9.02043	120	9.02283	121	10.97717	9.99760	59
2	9.02163	120	9.02404	121	10.97596	9.99759	58
3	9.02283	119	9.02525	120	10.97475	9.99757	57
4	9.02402	118	9.02645	121	10.97355	9.99756	56
5	9.01520	119	9.02766	119	10.97234	9.99755	55
6	9.02639	118	9.02885	120	10.97115	9.99753	54
7	9.02757	117	9.03005	119	10.96995	9.99752	53
8	9.02874	118	9.03124	118	10.96876	9.99751	52
9	9.02992	117	9.03242	119	10.96758	9.99749	51
10	9.03109	117	9.03361	118	10.96639	9.99748	50
11	9.03226	116	9.03479	118	10.96521	9.99747	49
12	9.03342	116	9.03597	117	10.96403	9.99745	48
13	9.03458	116	9.03714	118	10.96286	9.99744	47
14	9.03574	116	9.03832	116	10.96168	9.99742	46
15	9.03690	115	9.03948	117	10.96052	9.99741	45
16	9.03805	115	9.04065	116	10.95935	9.99740	44
17	9.03920	114	9.04181	116	10.95819	9.99738	43
18	9.04034	115	9.04297	116	10.95703	9.99737	42
19	9.04149	113	9.04413	115	10.95587	9.99736	41
20	9.04262	114	9.04528	115	10.95472	9.99734	40
21	9.04376	114	9.04643	115	10.95357	9.99733	39
22	9.04490	113	9.04758	115	10.95242	9.99731	38
23	9.04603	112	9.04873	114	10.95127	9.99730	37
24	9.04715	113	9.04987	114	10.95013	9.99728	36
25	9.04828	112	9.05101	113	10.94899	9.99727	35
26	9.04940	112	9.05214	114	10.94786	9.99726	34
27	9.05052	112	9.05328	113	10.94672	9.99724	33
28	9.05164	111	9.05441	112	10.94559	9.99723	32
29	9.05275	111	9.05553	113	10.94447	9.99721	31
30	9.05386	111	9.05666	112	10.94334	9.99720	30
31	9.05497	110	9.05778	112	10.94222	9.99718	29
32	9.05607	110	9.05890	112	10.94110	9.99717	28
33	9.05717	110	9.06002	111	10.93998	9.99716	27
34	9.05827	110	9.06113	111	10.93887	9.99714	26
35	9.05937	109	9.06224	111	10.93776	9.99713	25
36	9.06046	109	9.06335	110	10.93665	9.99711	24
37	9.06155	109	9.06445	111	10.93555	9.99710	23
38	9.06264	108	9.06556	110	10.93444	9.99708	22
39	9.06372	109	9.06666	109	10.93334	9.99707	21
40	9.06481	108	9.06775	110	10.93225	9.99705	20
41	9.06589	107	9.06885	109	10.93115	9.99704	19
42	9.06696	108	9.06994	109	10.93006	9.99702	18
43	9.06804	107	9.07103	108	10.92897	9.99701	17
44	9.06911	107	9.07211	109	10.92789	9.99699	16
45	9.07018	106	9.07320	108	10.92680	9.99698	15
46	9.07124	107	9.07428	108	10.92572	9.99696	14
47	9.07231	106	9.07536	107	10.92464	9.99695	13
48	9.07337	105	9.07643	108	10.92357	9.99693	12
49	9.07442	106	9.07751	107	10.92249	9.99692	11
50	9.07548	105	9.07858	106	10.92142	9.99690	10
51	9.07653	105	9.07964	107	10.92036	9.99689	9
52	9.07758	105	9.08071	106	10.91929	9.99687	8
53	9.07863	105	9.08177	106	10.91823	9.99686	7
54	9.07968	104	9.08283	106	10.91717	9.99684	6
55	9.08072	104	9.08389	106	10.91611	9.99683	5
56	9.08176	104	9.08495	105	10.91505	9.99681	4
57	9.08280	103	9.08600	105	10.91400	9.99680	3
58	9.08383	103	9.08705	105	10.91295	9.99678	2
59	9.08486	103	9.08810	104	10.91190	9.99677	1
60	9.08589		9.08914		10.91086	9.99675	0
	Cos.		Cot.		Tang.	Sin.	

83 Degrees.

7 Degrees.

′	Sin.	Dif.	Tang.	Dif.	Cot.	Cos.	′
0	9.08589	103	9.08914	105	10.91086	9.99675	60
1	9.08692	103	9.09019	104	10.90981	9.99674	59
2	9.08795	102	9.09123	104	10.90877	9.99672	58
3	9.08897	102	9.09227	103	10.90773	9.99670	57
4	9.08999	102	9.09330	104	10.90670	9.99669	56
5	9.09101	101	9.09434	103	10.90566	9.99667	55
6	9.09202	102	9.09537	103	10.90463	9.99666	54
7	9.09304	101	9.09640	102	10.90360	9.99664	53
8	9.09405	101	9.09742	103	10.90258	9.99663	52
9	9.09506	100	9.09845	102	10.90155	9.99661	51
10	9.09606	101	9.09947	102	10.90053	9.99659	50
11	9.09707	100	9.10049	101	10.89951	9.99658	49
12	9.09807	100	9.10150	102	10.89850	9.99656	48
13	9.09907	99	9.10252	101	10.89748	9.99655	47
14	9.10006	100	9.10353	101	10.89647	9.99653	46
15	9.10106	99	9.10454	101	10.89546	9.99651	45
16	9.10205	99	9.10555	101	10.89445	9.99650	44
17	9.10304	98	9.10656	100	10.89344	9.99648	43
18	9.10402	99	9.10756	100	10.89244	9.99647	42
19	9.10501	98	9.10856	100	10.89144	9.99645	41
20	9.10599	98	9.10956	100	10.89044	9.99643	40
21	9.10697	98	9.11056	99	10.88944	9.99642	39
22	9.10795	98	9.11155	99	10.88845	9.99640	38
23	9.10893	97	9.11254	99	10.88746	9.99638	37
24	9.10990	97	9.11353	99	10.88647	9.99637	36
25	9.11087	97	9.11452	99	10.88548	9.99635	35
26	9.11184	97	9.11551	98	10.88449	9.99633	34
27	9.11281	96	9.11649	98	10.88351	9.99632	33
28	9.11377	97	9.11747	98	10.88253	9.99630	32
29	9.11474	96	9.11845	98	10.88155	9.99629	31
30	9.11570	96	9.11943	97	10.88057	9.99627	30
31	9.11666	95	9.12040	98	10.87960	9.99625	29
32	9.11761	96	9.12138	97	10.87862	9.99624	28
33	9.11857	95	9.12235	97	10.87765	9.99622	27
34	9.11952	95	9.12332	96	10.87668	9.99620	26
35	9.12047	95	9.12428	97	10.87572	9.99618	25
36	9.12142	94	9.12525	96	10.87475	9.99617	24
37	9.12236	95	9.12621	96	10.87379	9.99615	23
38	9.12331	94	9.12717	96	10.87283	9.99613	22
39	9.12425	94	9.12813	96	10.87187	9.99612	21
40	9.12519	93	9.12909	95	10.87091	9.99610	20
41	9.12612	94	9.13004	95	10.86996	9.99608	19
42	9.12706	93	9.13099	95	10.86901	9.99607	18
43	9.12799	93	9.13194	95	10.86806	9.99605	17
44	9.12892	93	9.13289	95	10.86711	9.99603	16
45	9.12985	93	9.13384	94	10.86616	9.99601	15
46	9.13078	93	9.13478	95	10.86522	9.99600	14
47	9.13171	92	9.13573	94	10.86427	9.99598	13
48	9.13263	92	9.13667	94	10.86333	9.99596	12
49	9.13355	92	9.13761	93	10.86239	9.99595	11
50	9.13447	92	9.13854	94	10.86146	9.99593	10
51	9.13539	91	9.13948	93	10.86052	9.99591	9
52	9.13630	92	9.14041	93	10.85956	9.99589	8
53	9.13722	91	9.14134	93	10.85866	9.99588	7
54	9.13813	91	9.14227	93	10.85773	9.99586	6
55	9.13904	90	9.14320	92	10.85680	9.99584	5
56	9.13994	91	9.14412	92	10.85588	9.99582	4
57	9.14085	90	9.14504	93	10.85496	9.99581	3
58	9.14175	91	9.14597	91	10.85403	9.99579	2
59	9.14266	90	9.14688	92	10.85312	9.99577	1
60	9.14356		9.14780		10.85220	9.99575	0
	Cos.		Cot.		Tang.	Sin.	

82 Degrees.

8 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.14356	89	9.14780	92	10.85220	9.99575	60
1	9.14445	90	9.14872	91	10.85128	9.99574	59
2	9.14535	89	9.14963	91	10.85037	9.99572	58
3	9.14624	90	9.15054	91	10.84946	9.99570	57
4	9.14714	89	9.15145	91	10.84855	9.99568	56
5	9.14803	88	9.15236	91	10.84764	9.99566	55
6	9.14891	89	9.15327	90	10.84673	9.99565	54
7	9.14980	89	9.15417	91	10.84583	9.99563	53
8	9.15069	88	9.15508	90	10.84492	9.99561	52
9	9.15157	88	9.15598	90	10.84402	9.99559	51
10	9.15245	88	9.15688	89	10.84312	9.99557	50
11	9.15333	88	9.15777	90	10.84223	9.99556	49
12	9.15421	87	9.15867	89	10.84133	9.99554	48
13	9.15508	88	9.15956	90	10.84044	9.99552	47
14	9.15596	87	9.16046	89	10.83954	9.99550	46
15	9.15683	87	9.16135	89	10.83865	9.99548	45
16	9.15770	87	9.16224	88	10.83776	9.99546	44
17	9.15857	87	9.16312	89	10.83688	9.99545	43
18	9.15944	86	9.16401	88	10.83599	9.99543	42
19	9.16030	86	9.16489	88	10.83511	9.99541	41
20	9.16116	87	9.16577	88	10.83423	9.99539	40
21	9.16203	86	9.16665	88	10.83335	9.99537	39
22	9.16289	85	9.16753	88	10.83247	9.99535	38
23	9.16374	86	9.16841	87	10.83159	9.99533	37
24	9.16460	85	9.16928	88	10.83072	9.99532	36
25	9.16545	86	9.17016	87	10.82984	9.99530	35
26	9.16631	85	9.17103	87	10.82897	9.99528	34
27	9.16716	85	9.17190	87	10.82810	9.99526	33
28	9.16801	85	9.17277	86	10.82723	9.99524	32
29	9.16886	84	9.17363	87	10.82637	9.99522	31
30	9.16970	85	9.17450	86	10.82550	9.99520	30
31	9.17055	84	9.17536	86	10.82464	9.99518	29
32	9.17139	84	9.17622	86	10.82378	9.99517	28
33	9.17223	84	9.17708	86	10.82292	9.99515	27
34	9.17307	84	9.17794	86	10.82206	9.99513	26
35	9.17391	83	9.17880	85	10.82120	9.99511	25
36	9.17474	84	9.17965	86	10.82035	9.99509	24
37	9.17558	83	9.18051	85	10.81949	9.99507	23
38	9.17641	83	9.18136	85	10.81864	9.99505	22
39	9.17724	83	9.18221	85	10.81779	9.99503	21
40	9.17807	83	9.18306	85	10.81694	9.99501	20
41	9.17890	83	9.18391	84	10.81609	9.99499	19
42	9.17973	82	9.18475	85	10.81525	9.99497	18
43	9.18055	82	9.18560	84	10.81440	9.99495	17
44	9.18137	83	9.18644	84	10.81356	9.99494	16
45	9.18220	82	9.18728	84	10.81272	9.99492	15
46	9.18302	81	9.18812	84	10.81188	9.99490	14
47	9.18383	82	9.18896	83	10.81104	9.99488	13
48	9.18465	82	9.18979	84	10.81021	9.99486	12
49	9.18547	81	9.19063	83	10.80937	9.99484	11
50	9.18628	81	9.19146	83	10.80854	9.99482	10
51	9.18709	81	9.19229	83	10.80771	9.99480	9
52	9.18790	81	9.19312	83	10.80688	9.99478	8
53	9.18871	81	9.19395	83	10.80605	9.99476	7
54	9.18952	81	9.19478	83	10.80522	9.99474	6
55	9.19033	80	9.19561	82	10.80439	9.99472	5
56	9.19113	80	9.19643	82	10.80357	9.99470	4
57	9.19193	80	9.19725	82	10.80275	9.99468	3
58	9.19273	80	9.19807	82	10.80193	9.99466	2
59	9.19353	80	9.19889	82	10.80111	9.99464	1
60	9.19433		9.19971		10.80029	9.99462	0
	Cof.		Cot.		Tang.	Sin.	

81 Degrees.

9 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.19433	80	9.19971	82	10.80029	9.99462	60
1	9.19513	79	9.20053	81	10.79947	9.99460	59
2	9.19592	80	9.20134	82	10.79866	9.99458	58
3	9.19672	79	9.20216	81	10.79784	9.99456	57
4	9.19751	79	9.20297	81	10.79703	9.99454	56
5	9.19830	79	9.20378	81	10.79622	9.99452	55
6	9.19909	79	9.20459	81	10.79541	9.99450	54
7	9.19988	79	9.20540	81	10.79460	9.99448	53
8	9.20067	79	9.20621	80	10.79379	9.99446	52
9	9.20145	78	9.20701	81	10.79299	9.99444	51
10	9.20223	78	9.20782	80	10.79218	9.99442	50
11	9.20302	79	9.20862	80	10.79138	9.99440	49
12	9.20380	78	9.20942	80	10.79058	9.99438	48
13	9.20458	78	9.21022	80	10.78978	9.99436	47
14	9.20535	77	9.21102	80	10.78898	9.99434	46
15	9.20613	78	9.21182	79	10.78818	9.99432	45
16	9.20691	78	9.21261	80	10.78739	9.99429	44
17	9.20768	77	9.21341	79	10.78659	9.99427	43
18	9.20845	77	9.21420	79	10.78580	9.99425	42
19	9.20922	77	9.21499	79	10.78501	9.99423	41
20	9.20999	77	9.21578	79	10.78422	9.99421	40
21	9.21076	77	9.21657	79	10.78343	9.99419	39
22	9.21153	77	9.21736	78	10.78264	9.99417	38
23	9.21229	76	9.21814	79	10.78186	9.99415	37
24	9.21306	77	9.21893	78	10.78107	9.99413	36
25	9.21382	76	9.21971	78	10.78029	9.99411	35
26	9.21458	76	9.22049	78	10.77951	9.99409	34
27	9.21534	76	9.22127	78	10.77873	9.99407	33
28	9.21610	76	9.22205	78	10.77795	9.99404	32
29	9.21685	75	9.22283	78	10.77717	9.99402	31
30	9.21761	76	9.22361	77	10.77639	9.99400	30
31	9.21836	75	9.22438	78	10.77562	9.99398	29
32	9.21912	76	9.22516	77	10.77484	9.99396	28
33	9.21987	75	9.22593	77	10.77407	9.99394	27
34	9.22062	75	9.22670	77	10.77330	9.99392	26
35	9.22137	75	9.22747	77	10.77253	9.99390	25
36	9.22211	74	9.22824	77	10.77176	9.99388	24
37	9.22286	75	9.22901	77	10.77099	9.99385	23
38	9.22361	75	9.22977	76	10.77023	9.99383	22
39	9.22435	74	9.23054	77	10.76946	9.99381	21
40	9.22509	74	9.23130	76	10.76870	9.99379	20
41	9.22583	74	9.23206	76	10.76794	9.99377	19
42	9.22657	74	9.23283	77	10.76717	9.99375	18
43	9.22731	74	9.23359	76	10.76641	9.99372	17
44	9.22805	74	9.23435	76	10.76565	9.99370	16
45	9.22878	73	9.23510	75	10.76490	9.99368	15
46	9.22952	74	9.23586	76	10.76414	9.99366	14
47	9.23025	73	9.23661	75	10.76339	9.99364	13
48	9.23098	73	9.23737	76	10.76263	9.99362	12
49	9.23171	73	9.23812	75	10.76188	9.99359	11
50	9.23244	73	9.23887	75	10.76113	9.99357	10
51	9.23317	73	9.23962	75	10.76038	9.99355	9
52	9.23390	73	9.24037	75	10.75963	9.99353	8
53	9.23462	72	9.24112	75	10.75888	9.99351	7
54	9.23535	73	9.24186	74	10.75814	9.99348	6
55	9.23607	72	9.24261	75	10.75739	9.99346	5
56	9.23679	72	9.24335	74	10.75665	9.99344	4
57	9.23752	73	9.24410	75	10.75590	9.99342	3
58	9.23823	71	9.24484	74	10.75516	9.99340	2
59	9.23895	72	9.24558	74	10.75442	9.99337	1
60	9.23967	72	9.24632	74	10.75368	9.99335	0
	Cof.		Cot.		Tang.	Sin.	

80 Degrees.

10 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cos.	′
0	9.23967		9.24632		10.75368	9.99335	60
1	9.24039	72	9.24706	74	10.75294	9.99333	59
2	9.24110	71	9.24779	73	10.75221	9.99331	58
3	9.24181	71	9.24853	74	10.75147	9.99328	57
4	9.24253	72	9.24926	73	10.75074	9.99326	56
5	9.24324	71	9.25000	74	10.75000	9.99324	55
6	9.24395	71	9.25073	73	10.74927	9.99322	54
7	9.24466	71	9.25146	73	10.74854	9.99319	53
8	9.24536	70	9.25219	73	10.74781	9.99317	52
9	9.24607	71	9.25292	73	10.74708	9.99315	51
10	9.24677	70	9.25365	72	10.74635	9.99313	50
11	9.24748	71	9.25437	72	10.74563	9.99310	49
12	9.24818	70	9.25510	73	10.74490	9.99308	48
13	9.24888	70	9.25582	72	10.74418	9.99306	47
14	9.24958	70	9.25655	73	10.74345	9.99304	46
15	9.25028	70	9.25727	72	10.74273	9.99301	45
16	9.25098	70	9.25799	72	10.74201	9.99299	44
17	9.25168	70	9.25871	72	10.74129	9.99297	43
18	9.25237	69	9.25943	72	10.74057	9.99294	42
19	9.25307	70	9.26015	72	10.73985	9.99292	41
20	9.25376	69	9.26086	71	10.73914	9.99290	40
21	9.25445	69	9.26158	72	10.73842	9.99288	39
22	9.25514	69	9.26229	71	10.73771	9.99285	38
23	9.25583	69	9.26301	72	10.73699	9.99283	37
24	9.25652	69	9.26372	71	10.73628	9.99281	36
25	9.25721	69	9.26443	71	10.73557	9.99278	35
26	9.25790	68	9.26514	71	10.73486	9.99276	34
27	9.25858	69	9.26585	70	10.73415	9.99274	33
28	9.25927	68	9.26655	71	10.73345	9.99271	32
29	9.25995	68	9.26726	71	10.73274	9.99269	31
30	9.26063	68	9.26797	70	10.73203	9.99267	30
31	9.26131	68	9.26867	70	10.73133	9.99264	29
32	9.26199	68	9.26937	71	10.73063	9.99262	28
33	9.26267	68	9.27008	70	10.72992	9.99260	27
34	9.26335	68	9.27078	70	10.72922	9.99257	26
35	9.26403	67	9.27148	70	10.72852	9.99255	25
36	9.26470	68	9.27218	70	10.72782	9.99252	24
37	9.26538	67	9.27288	69	10.72712	9.99250	23
38	9.26605	67	9.27357	70	10.72643	9.99248	22
39	9.26672	67	9.27427	69	10.72573	9.99245	21
40	9.26739	67	9.27496	70	10.72504	9.99243	20
41	9.26806	67	9.27566	69	10.72434	9.99241	19
42	9.26873	67	9.27635	69	10.72365	9.99238	18
43	9.26940	67	9.27704	69	10.72296	9.99236	17
44	9.27007	67	9.27773	69	10.72227	9.99233	16
45	9.27073	66	9.27842	69	10.72158	9.99231	15
46	9.27140	67	9.27911	69	10.72089	9.99229	14
47	9.27206	66	9.27980	69	10.72020	9.99226	13
48	9.27273	67	9.28049	68	10.71951	9.99224	12
49	9.27339	66	9.28117	69	10.71883	9.99221	11
50	9.27405	66	9.28186	68	10.71814	9.99219	10
51	9.27471	66	9.28254	69	10.71746	9.99217	9
52	9.27537	66	9.28323	68	10.71677	9.99214	8
53	9.27602	65	9.28391	68	10.71609	9.99212	7
54	9.27663	66	9.28459	68	10.71541	9.99209	6
55	9.27734	66	9.28527	68	10.71473	9.99207	5
56	9.27799	65	9.28595	67	10.71405	9.99204	4
57	9.27864	65	9.28662	68	10.71338	9.99202	3
58	9.27930	66	9.28730	68	10.71270	9.99200	2
59	9.27995	65	9.28798	67	10.71202	9.99197	1
60	9.28060	65	9.28865		10.71135	9.99195	0
	Cof.		Cot.		Tang.	Sin.	

79 Degrees.

11 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cos.	′
0	9.28060	65	9.28865	68	10.71135	9.99195	60
1	9.28125	65	9.28933	67	10.71067	9.99192	59
2	9.28190	64	9.29000	67	10.71000	9.99190	58
3	9.28254	65	9.29067	67	10.70933	9.99187	57
4	9.28319	65	9.29134	67	10.70866	9.99185	56
5	9.28384	64	9.29201	67	10.70799	9.99182	55
6	9.28448	64	9.29268	67	10.70732	9.99180	54
7	9.28512	65	9.29335	67	10.70665	9.99177	53
8	9.28577	64	9.29402	66	10.70598	9.99175	52
9	9.28641	64	9.29468	67	10.70532	9.99172	51
10	9.28705	64	9.29535	66	10.70465	9.99170	50
11	9.28769	64	9.29601	67	10.70399	9.99167	49
12	9.28833	63	9.29668	66	10.70332	9.99165	48
13	9.28896	64	9.29734	66	10.70266	9.99162	47
14	9.28960	64	9.29800	66	10.70200	9.99160	46
15	9.29024	63	9.29866	66	10.70134	9.99157	45
16	9.29087	63	9.29932	66	10.70068	9.99155	44
17	9.29150	64	9.29998	66	10.70002	9.99152	43
18	9.29214	63	9.30064	66	10.69936	9.99150	42
19	9.29277	63	9.30130	65	10.69870	9.99147	41
20	9.29340	63	9.30195	66	10.69805	9.99145	40
21	9.29403	63	9.30261	65	10.69739	9.99142	39
22	9.29466	63	9.30326	65	10.69674	9.99140	38
23	9.29529	62	9.30391	66	10.69609	9.99137	37
24	9.29591	63	9.30457	65	10.69543	9.99135	36
25	9.29654	62	9.30522	65	10.69478	9.99132	35
26	9.29716	63	9.30587	65	10.69413	9.99130	34
27	9.29779	62	9.30652	65	10.69348	9.99127	33
28	9.29841	62	9.30717	65	10.69283	9.99124	32
29	9.29903	63	9.30782	64	10.69218	9.99122	31
30	9.29966	62	9.30846	65	10.69154	9.99119	30
31	9.30028	62	9.30911	64	10.69089	9.99117	29
32	9.30090	61	9.30975	65	10.69025	9.99114	28
33	9.30151	62	9.31040	64	10.68960	9.99112	27
34	9.30213	62	9.31104	64	10.68896	9.99109	26
35	9.30275	61	9.31168	65	10.68832	9.99106	25
36	9.30336	62	9.31233	64	10.68767	9.99104	24
37	9.30398	61	9.31297	64	10.68703	9.99101	23
38	9.30459	62	9.31361	64	10.68639	9.99099	22
39	9.30521	61	9.31425	64	10.68575	9.99096	21
40	9.30582	61	9.31489	63	10.68511	9.99093	20
41	9.30643	61	9.31552	64	10.68448	9.99091	19
42	9.30704	61	9.31616	63	10.68384	9.99088	18
43	9.30765	61	9.31679	64	10.68321	9.99086	17
44	9.30826	61	9.31743	63	10.68257	9.99083	16
45	9.30887	60	9.31806	64	10.68194	9.99080	15
46	9.30947	61	9.31870	63	10.68130	9.99078	14
47	9.31008	60	9.31933	63	10.68067	9.99075	13
48	9.31068	61	9.31996	63	10.68004	9.99072	12
49	9.31129	60	9.32059	63	10.67941	9.99070	11
50	9.31189	61	9.32122	63	10.67878	9.99067	10
51	9.31250	60	9.32185	63	10.67815	9.99064	9
52	9.31310	60	9.32248	63	10.67752	9.99062	8
53	9.31370	60	9.32311	62	10.67689	9.99059	7
54	9.31430	60	9.32373	63	10.67627	9.99056	6
55	9.31490	59	9.32436	62	10.67564	9.99054	5
56	9.31549	60	9.32498	63	10.67502	9.99051	4
57	9.31609	60	9.32561	62	10.67439	9.99048	3
58	9.31669	59	9.32623	62	10.67377	9.99046	2
59	9.31728	60	9.32685	62	10.67315	9.99043	1
60	9.31788		9.32747		10.67253	9.99040	0
	Cof.		Cot.		Tang.	Sin.	

78 Degrees.

12 Degrees.							
′	Sin.	D.	Tang.	D.	Cot.	Cos.	′
0	9.31783	59	9.32747	63	10.67253	9.99040	60
1	9.31847	60	9.32810	62	10.67190	9.99038	59
2	9.31907	59	9.32872	61	10.67128	9.99035	58
3	9.31966	59	9.32933	62	10.67067	9.99032	57
4	9.32025	59	9.32995	62	10.67005	9.99030	56
5	9.32084	59	9.33057	62	10.66943	9.99027	55
6	9.32143	59	9.33119	61	10.66881	9.99024	54
7	9.32202	59	9.33180	62	10.66820	9.99022	53
8	9.32261	58	9.33242	61	10.66758	9.99019	52
9	9.32319	59	9.33303	62	10.66697	9.99016	51
10	9.32378	59	9.33365	61	10.66635	9.99013	50
11	9.32437	58	9.33426	61	10.66574	9.99011	49
12	9.32495	58	9.33487	61	10.66513	9.99008	48
13	9.32553	59	9.33548	61	10.66452	9.99005	47
14	9.32612	58	9.33609	61	10.66391	9.99002	46
15	9.32670	58	9.33670	61	10.66330	9.99000	45
16	9.32728	58	9.33731	61	10.66269	9.98997	44
17	9.32786	58	9.33792	61	10.66208	9.98994	43
18	9.32844	58	9.33853	60	10.66147	9.98991	42
19	9.32902	58	9.33913	61	10.66087	9.98989	41
20	9.32960	58	9.33974	60	10.66026	9.98986	40
21	9.33018	57	9.34034	61	10.65966	9.98983	39
22	9.33075	58	9.34095	60	10.65905	9.98980	38
23	9.33133	57	9.34155	60	10.65845	9.98978	37
24	9.33190	58	9.34215	61	10.65785	9.98975	36
25	9.33248	57	9.34276	60	10.65724	9.98972	35
26	9.33305	57	9.34336	60	10.65664	9.98969	34
27	9.33362	58	9.34396	60	10.65604	9.98967	33
28	9.33420	57	9.34456	60	10.65544	9.98964	32
29	9.33477	57	9.34516	60	10.65484	9.98961	31
30	9.33534	57	9.34576	59	10.65424	9.98958	30
31	9.33591	56	9.34635	60	10.65365	9.98955	29
32	9.33647	57	9.34695	60	10.65305	9.98953	28
33	9.33704	57	9.34755	59	10.65245	9.98950	27
34	9.33761	57	9.34814	60	10.65186	9.98947	26
35	9.33818	56	9.34874	59	10.65126	9.98944	25
36	9.33874	57	9.34933	59	10.65067	9.98941	24
37	9.33931	56	9.34992	59	10.65008	9.98938	23
38	9.33987	56	9.35051	60	10.64949	9.98936	22
39	9.34043	57	9.35111	59	10.64889	9.98933	21
40	9.34100	56	9.35170	59	10.64830	9.98930	20
41	9.34156	56	9.35229	59	10.64771	9.98927	19
42	9.34212	56	9.35288	59	10.64712	9.98924	18
43	9.34268	56	9.35347	58	10.64653	9.98921	17
44	9.34324	56	9.35405	59	10.64595	9.98919	16
45	9.34380	56	9.35464	59	10.64536	9.98916	15
46	9.34436	55	9.35523	58	10.64477	9.98913	14
47	9.34491	56	9.35581	59	10.64419	9.98910	13
48	9.34547	55	9.35640	58	10.64360	9.98907	12
49	9.34602	56	9.35698	59	10.64302	9.98904	11
50	9.34658	55	9.35757	58	10.64243	9.98901	10
51	9.34713	56	9.35815	58	10.64185	9.98898	9
52	9.34769	55	9.35873	58	10.64127	9.98896	8
53	9.34824	55	9.35931	58	10.64069	9.98893	7
54	9.34879	55	9.35989	58	10.64011	9.98890	6
55	9.34934	55	9.36047	58	10.63953	9.98887	5
56	9.34989	55	9.36105	58	10.63895	9.98884	4
57	9.35044	55	9.36163	58	10.63837	9.98881	3
58	9.35099	55	9.36221	58	10.63779	9.98878	2
59	9.35154	55	9.36279	58	10.63721	9.98875	1
60	9.35209	55	9.36336	57	10.63664	9.98872	0
	Cos.		Cot.		Tang.	Sin.	
77 Degrees.							

13 Degrees.							
′	Sin.	D.	Tang.	D.	Cot.	Cos.	′
0	9.35209	54	9.36336	58	10.63664	9.98872	60
1	9.35263	54	9.36394	58	10.63606	9.98869	59
2	9.35318	55	9.36452	57	10.63548	9.98867	58
3	9.35373	54	9.36509	57	10.63491	9.98864	57
4	9.35427	54	9.36566	58	10.63434	9.98861	56
5	9.35481	55	9.36624	57	10.63376	9.98858	55
6	9.35536	54	9.36681	57	10.63319	9.98855	54
7	9.35590	54	9.36738	57	10.63262	9.98852	53
8	9.35644	54	9.36795	57	10.63205	9.98849	52
9	9.35698	54	9.36852	57	10.63148	9.98846	51
10	9.35752	54	9.36909	57	10.63091	9.98843	50
11	9.35806	54	9.36966	57	10.63034	9.98840	49
12	9.35860	54	9.37023	57	10.62977	9.98837	48
13	9.35914	54	9.37080	57	10.62920	9.98834	47
14	9.35968	54	9.37137	56	10.62863	9.98831	46
15	9.36022	53	9.37193	57	10.62807	9.98828	45
16	9.36075	54	9.37250	56	10.62750	9.98825	44
17	9.36129	53	9.37306	57	10.62694	9.98822	43
18	9.36182	54	9.37363	56	10.62637	9.98819	42
19	9.36236	53	9.37419	57	10.62581	9.98816	41
20	9.36289	53	9.37476	56	10.62524	9.98813	40
21	9.36342	53	9.37532	56	10.62468	9.98810	39
22	9.36395	54	9.37588	56	10.62412	9.98807	38
23	9.36449	53	9.37644	56	10.62356	9.98804	37
24	9.36502	53	9.37700	56	10.62300	9.98801	36
25	9.36555	53	9.37756	56	10.62244	9.98798	35
26	9.36608	52	9.37812	56	10.62188	9.98795	34
27	9.36660	53	9.37868	56	10.62132	9.98792	33
28	9.36713	53	9.37924	56	10.62076	9.98789	32
29	9.36766	53	9.37980	55	10.62020	9.98786	31
30	9.36819	52	9.38035	56	10.61965	9.98783	30
31	9.36871	53	9.38091	56	10.61909	9.98780	29
32	9.36924	52	9.38147	55	10.61853	9.98777	28
33	9.36976	52	9.38202	55	10.61798	9.98774	27
34	9.37028	53	9.38257	56	10.61743	9.98771	26
35	9.37081	52	9.38313	55	10.61687	9.98768	25
36	9.37133	52	9.38368	55	10.61632	9.98765	24
37	9.37185	52	9.38423	56	10.61577	9.98762	23
38	9.37237	52	9.38479	55	10.61521	9.98759	22
39	9.37289	52	9.38534	55	10.61466	9.98756	21
40	9.37341	52	9.38589	55	10.61411	9.98753	20
41	9.37393	52	9.38644	55	10.61356	9.98750	19
42	9.37445	52	9.38699	55	10.61301	9.98746	18
43	9.37497	52	9.38754	54	10.61246	9.98743	17
44	9.37549	51	9.38808	55	10.61192	9.98740	16
45	9.37600	52	9.38863	55	10.61137	9.98737	15
46	9.37652	51	9.38918	54	10.61082	9.98734	14
47	9.37703	52	9.38972	55	10.61028	9.98731	13
48	9.37755	51	9.39027	55	10.60973	9.98728	12
49	9.37806	52	9.39082	54	10.60918	9.98725	11
50	9.37858	51	9.39136	54	10.60864	9.98722	10
51	9.37909	51	9.39190	54	10.60810	9.98719	9
52	9.37960	51	9.39245	54	10.60755	9.98715	8
53	9.38011	51	9.39299	54	10.60701	9.98712	7
54	9.38062	51	9.39353	54	10.60647	9.98709	6
55	9.38113	51	9.39407	54	10.60593	9.98706	5
56	9.38164	51	9.39461	54	10.60539	9.98703	4
57	9.38215	51	9.39515	54	10.60485	9.98700	3
58	9.38266	51	9.39569	54	10.60431	9.98697	2
59	9.38317	51	9.39623	54	10.60377	9.98694	1
60	9.38368	51	9.39677	54	10.60323	9.98690	0
	Cos.		Cot.		Tang.	Sin.	
76 Degrees.							

14 Degrees.						
′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.38368	50	9.39677	54	10.60323	9.98690	60
1	9.38418	51	9.39731	54	10.60269	9.98687	59
2	9.38469	50	9.39785	53	10.60215	9.98684	58
3	9.38519	51	9.39838	54	10.60162	9.98681	57
4	9.38570	50	9.39892	53	10.60108	9.98678	56
5	9.38620	50	9.39945	54	10.60055	9.98675	55
6	9.38670	51	9.39999	53	10.60001	9.98671	54
7	9.38721	50	9.40052	54	10.59948	9.98668	53
8	9.38771	50	9.40106	53	10.59894	9.98665	52
9	9.38821	50	9.40159	53	10.59841	9.98662	51
10	9.38871	50	9.40212	54	10.59788	9.98659	50
11	9.38921	50	9.40266	53	10.59734	9.98656	49
12	9.38971	50	9.40319	53	10.59681	9.98652	48
13	9.39021	50	9.40372	53	10.59628	9.98649	47
14	9.39071	50	9.40425	53	10.59575	9.98646	46
15	9.39121	49	9.40478	53	10.59522	9.98643	45
16	9.39170	50	9.40531	53	10.59469	9.98640	44
17	9.39220	50	9.40584	52	10.59416	9.98636	43
18	9.39270	49	9.40636	53	10.59364	9.98633	42
19	9.39319	50	9.40689	53	10.59311	9.98630	41
20	9.39369	49	9.40742	53	10.59258	9.98627	40
21	9.39418	49	9.40795	52	10.59205	9.98623	39
22	9.39467	50	9.40847	53	10.59153	9.98620	38
23	9.39517	49	9.40900	52	10.59100	9.98617	37
24	9.39566	49	9.40952	53	10.59048	9.98614	36
25	9.39615	49	9.41005	52	10.58995	9.98610	35
26	9.39664	49	9.41057	52	10.58943	9.98607	34
27	9.39713	49	9.41109	52	10.58891	9.98604	33
28	9.39762	49	9.41161	53	10.58839	9.98601	32
29	9.39811	49	9.41214	52	10.58786	9.98597	31
30	9.39860	49	9.41266	52	10.58734	9.98594	30
31	9.39909	49	9.41318	52	10.58682	9.98591	29
32	9.39958	48	9.41370	52	10.58630	9.98588	28
33	9.40006	49	9.41422	52	10.58578	9.98584	27
34	9.40055	48	9.41474	52	10.58526	9.98581	26
35	9.40103	49	9.41526	52	10.58474	9.98578	25
36	9.40152	48	9.41578	51	10.58422	9.98574	24
37	9.40200	49	9.41629	52	10.58371	9.98571	23
38	9.40249	48	9.41681	52	10.58319	9.98568	22
39	9.40297	49	9.41733	51	10.58267	9.98565	21
40	9.40346	48	9.41784	52	10.58216	9.98561	20
41	9.40394	48	9.41836	51	10.58164	9.98558	19
42	9.40442	48	9.41887	52	10.58113	9.98555	18
43	9.40490	48	9.41939	51	10.58061	9.98551	17
44	9.40538	48	9.41990	51	10.58010	9.98548	16
45	9.40586	48	9.42041	52	10.57959	9.98545	15
46	9.40634	48	9.42093	51	10.57907	9.98541	14
47	9.40682	48	9.42144	51	10.57856	9.98538	13
48	9.40730	48	9.42195	51	10.57805	9.98535	12
49	9.40778	47	9.42246	51	10.57754	9.98531	11
50	9.40825	48	9.42297	51	10.57703	9.98528	10
51	9.40873	48	9.42348	51	10.57652	9.98525	9
52	9.40921	47	9.42399	51	10.57601	9.98521	8
53	9.40968	48	9.42450	51	10.57550	9.98518	7
54	9.41016	47	9.42501	51	10.57499	9.98515	6
55	9.41063	48	9.42552	51	10.57448	9.98511	5
56	9.41111	47	9.42603	50	10.57397	9.98508	4
57	9.41158	47	9.42653	51	10.57347	9.98505	3
58	9.41205	47	9.42704	51	10.57296	9.98501	2
59	9.41252	48	9.42755	50	10.57245	9.98498	1
60	9.41300		9.42805		10.57195	9.98494	0
	Cof.		Cot.		Tang.	Sin.	
75 Degrees.							

15 Degrees.						
′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.41300	47	9.42805	51	10.57195	9.98494	60
1	9.41347	47	9.42856	50	10.57144	9.98491	59
2	9.41394	47	9.42906	51	10.57094	9.98488	58
3	9.41441	47	9.42957	50	10.57043	9.98484	57
4	9.41488	47	9.43007	50	10.56993	9.98481	56
5	9.41535	47	9.43057	51	10.56943	9.98477	55
6	9.41582	46	9.43108	50	10.56892	9.98474	54
7	9.41628	47	9.43158	50	10.56842	9.98471	53
8	9.41675	47	9.43208	50	10.56792	9.98467	52
9	9.41722	46	9.43258	50	10.56742	9.98464	51
10	9.41768	47	9.43308	50	10.56692	9.98460	50
11	9.41815	46	9.43358	50	10.56642	9.98457	49
12	9.41861	47	9.43408	50	10.56592	9.98453	48
13	9.41908	46	9.43458	50	10.56542	9.98450	47
14	9.41954	47	9.43508	50	10.56492	9.98447	46
15	9.42001	46	9.43558	49	10.56442	9.98443	45
16	9.42047	46	9.43607	50	10.56393	9.98440	44
17	9.42093	47	9.43657	50	10.56343	9.98436	43
18	9.42140	46	9.43707	49	10.56293	9.98433	42
19	9.42186	46	9.43756	50	10.56244	9.98429	41
20	9.42232	46	9.43806	49	10.56194	9.98426	40
21	9.42278	46	9.43855	50	10.56145	9.98422	39
22	9.42324	46	9.43905	49	10.56095	9.98419	38
23	9.42370	46	9.43954	50	10.56046	9.98415	37
24	9.42416	45	9.44004	49	10.55996	9.98412	36
25	9.42461	46	9.44053	49	10.55947	9.98409	35
26	9.42507	46	9.44102	49	10.55898	9.98405	34
27	9.42553	46	9.44151	50	10.55849	9.98402	33
28	9.42599	46	9.44201	49	10.55799	9.98398	32
29	9.42644	45	9.44250	49	10.55750	9.98395	31
30	9.42690	46	9.44299	49	10.55701	9.98391	30
31	9.42735	46	9.44348	49	10.55652	9.98388	29
32	9.42781	45	9.44397	49	10.55603	9.98384	28
33	9.42826	46	9.44446	49	10.55554	9.98381	27
34	9.42872	45	9.44495	49	10.55505	9.98377	26
35	9.42917	45	9.44544	48	10.55456	9.98373	25
36	9.42962	46	9.44592	49	10.55408	9.98370	24
37	9.43008	45	9.44641	49	10.55359	9.98366	23
38	9.43053	45	9.44690	48	10.55310	9.98363	22
39	9.43098	45	9.44738	49	10.55262	9.98359	21
40	9.43143	45	9.44787	49	10.55213	9.98356	20
41	9.43188	45	9.44836	48	10.55164	9.98352	19
42	9.43233	45	9.44884	49	10.55116	9.98349	18
43	9.43278	45	9.44933	48	10.55067	9.98345	17
44	9.43323	45	9.44981	48	10.55019	9.98342	16
45	9.43367	44	9.45029	49	10.54971	9.98338	15
46	9.43412	45	9.45078	48	10.54922	9.98334	14
47	9.43457	45	9.45126	48	10.54874	9.98331	13
48	9.43502	44	9.45174	48	10.54826	9.98327	12
49	9.43546	45	9.45222	49	10.54778	9.98324	11
50	9.43591	44	9.45271	48	10.54729	9.98320	10
51	9.43635	45	9.45319	48	10.54681	9.98317	9
52	9.43680	44	9.45367	48	10.54633	9.98313	8
53	9.43724	45	9.45415	48	10.54585	9.98309	7
54	9.43769	44	9.45463	48	10.54537	9.98306	6
55	9.43813	44	9.45511	48	10.54489	9.98302	5
56	9.43857	44	9.45559	47	10.54441	9.98299	4
57	9.43901	44	9.45606	48	10.54394	9.98295	3
58	9.43946	45	9.45654	48	10.54346	9.98291	2
59	9.43990	44	9.45702	48	10.54298	9.98288	1
60	9.44034	44	9.45750	48	10.54250	9.98284	0
	Cof.		Cot.		Tang.	Sin.	
74 Degrees.							

′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.44034		9.45750		10.54250	9.98284	60
1	9.44078	44	9.45797	47	10.54203	9.98281	59
2	9.44122	44	9.45845	48	10.54155	9.98277	58
3	9.44166	44	9.45892	47	10.54108	9.98273	57
4	9.44210	44	9.45940	48	10.54060	9.98270	56
5	9.44253	43	9.45987	47	10.54013	9.98266	55
6	9.44297	44	9.46035	48	10.53965	9.98262	54
7	9.44341	44	9.46082	47	10.53618	9.98259	53
8	9.44385	44	9.46130	48	10.53870	9.98255	52
9	9.44428	43	9.46177	47	10.53823	9.98211	51
10	9.44472	44	9.46224	47	10.53776	9.98248	50
11	9.44516	44	9.46271	47	10.53729	9.98244	49
12	9.44559	43	9.46319	48	10.53681	9.98240	48
13	9.44602	43	9.46366	47	10.53634	9.98237	47
14	9.44646	44	9.46413	47	10.53587	9.98233	46
15	9.44689	43	9.46460	47	10.53540	9.98229	45
16	9.44733	44	9.46507	47	10.53493	9.98226	44
17	9.44776	43	9.46554	47	10.53446	9.98222	43
18	9.44819	43	9.46601	47	10.53399	9.98218	42
19	9.44862	43	9.46648	47	10.53352	9.98215	41
20	9.44905	43	9.46694	46	10.53306	9.98211	40
21	9.44948	43	9.46741	47	10.53259	9.98207	39
22	9.44992	44	9.46788	47	10.53212	9.98204	38
23	9.45035	43	9.46835	47	10.53165	9.98200	37
24	9.45077	42	9.46881	46	10.53119	9.98196	36
25	9.45120	43	9.46928	47	10.53072	9.98192	35
26	9.45163	43	9.46975	47	10.53025	9.98189	34
27	9.45206	43	9.47021	46	10.52979	9.98185	33
28	9.45249	43	9.47068	47	10.52932	9.98181	32
29	9.45292	43	9.47114	46	10.52886	9.98177	31
30	9.45334	42	9.47160	46	10.52840	9.98174	30
31	9.45377	43	9.47207	47	10.52793	9.98170	29
32	9.45419	42	9.47253	46	10.52747	9.98166	28
33	9.45462	43	9.47299	46	10.52701	9.98162	27
34	9.45504	42	9.47346	47	10.52654	9.98159	26
35	9.45547	43	9.47392	46	10.52608	9.98155	25
36	9.45589	42	9.47438	46	10.52562	9.98151	24
37	9.45632	43	9.47484	46	10.52516	9.98147	23
38	9.45674	42	9.47530	46	10.52470	9.98144	22
39	9.45716	42	9.47576	46	10.52424	9.98140	21
40	9.45758	42	9.47622	46	10.52378	9.98136	20
41	9.45801	43	9.47668	46	10.52332	9.98132	19
42	9.45843	42	9.47714	46	10.52286	9.98129	18
43	9.45885	42	9.47760	46	10.52240	9.98125	17
44	9.45927	42	9.47806	46	10.52194	9.98121	16
45	9.45969	42	9.47852	46	10.52148	9.98117	15
46	9.46011	42	9.47897	45	10.52103	9.98113	14
47	9.46053	42	9.47943	46	10.52057	9.98110	13
48	9.46095	42	9.47989	46	10.52011	9.98106	12
49	9.46136	41	9.48035	46	10.51965	9.98102	11
50	9.46178	42	9.48080	45	10.51920	9.98098	10
51	9.46220	42	9.48126	46	10.51874	9.98094	9
52	9.46262	42	9.48171	45	10.51829	9.98090	8
53	9.46303	41	9.48217	46	10.51783	9.98087	7
54	9.46345	42	9.48262	45	10.51738	9.98083	6
55	9.46386	41	9.48307	45	10.51693	9.98079	5
56	9.46428	42	9.48353	46	10.51647	9.98075	4
57	9.46469	41	9.48398	45	10.51602	9.98071	3
58	9.46511	42	9.48443	45	10.51557	9.98067	2
59	9.46552	41	9.48489	46	10.51511	9.98063	1
60	9.46594	42	9.48534	45	10.51466	9.98060	0
	Cof.		Cot.		Tang.	Sin.	

73 Degrees.

16 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	′
0	9.46594		9.48534		10.51466	9.98060	60
1	9.46635	41	9.48579	45	10.51421	9.98056	59
2	9.46676	41	9.48624	45	10.51376	9.98052	58
3	9.46717	41	9.48669	45	10.51331	9.98048	57
4	9.46758	41	9.48714	45	10.51286	9.98044	56
5	9.46800	42	9.48759	45	10.51241	9.98040	55
6	9.46841	41	9.48804	45	10.51196	9.98036	54
7	9.46882	41	9.48849	45	10.51151	9.98032	53
8	9.46923	41	9.48894	45	10.51106	9.98029	52
9	9.46964	41	9.48939	45	10.51061	9.98025	51
10	9.47005	41	9.48984	45	10.51016	9.98021	50
11	9.47045	40	9.49029	45	10.50971	9.98017	49
12	9.47086	41	9.49073	44	10.50927	9.98013	48
13	9.47127	41	9.49118	45	10.50882	9.98009	47
14	9.47168	41	9.49163	45	10.50837	9.98005	46
15	9.47209	41	9.49207	44	10.50793	9.98001	45
16	9.47249	40	9.49252	45	10.50748	9.97997	44
17	9.47290	41	9.49296	44	10.50704	9.97993	43
18	9.47330	40	9.49341	45	10.50659	9.97989	42
19	9.47371	41	9.49385	44	10.50615	9.97986	41
20	9.47411	40	9.49430	45	10.50570	9.97982	40
21	9.47452	41	9.49474	44	10.50526	9.97978	39
22	9.47492	40	9.49519	45	10.50481	9.97974	38
23	9.47533	41	9.49563	44	10.50437	9.97970	37
24	9.47573	40	9.49607	44	10.50393	9.97966	36
25	9.47613	40	9.49652	45	10.50348	9.97962	35
26	9.47654	41	9.49696	44	10.50304	9.97958	34
27	9.47694	40	9.49740	44	10.50260	9.97954	33
28	9.47734	40	9.49784	44	10.50216	9.97950	32
29	9.47774	40	9.49828	44	10.50172	9.97946	31
30	9.47814	40	9.49872	44	10.50128	9.97942	30
31	9.47854	40	9.49916	44	10.50084	9.97938	29
32	9.47894	40	9.49960	44	10.50040	9.97934	28
33	9.47934	40	9.50004	44	10.49996	9.97930	27
34	9.47974	40	9.50048	44	10.49952	9.97926	26
35	9.48014	40	9.50092	44	10.49908	9.97922	25
36	9.48054	40	9.50136	44	10.49864	9.97918	24
37	9.48094	40	9.50180	44	10.49820	9.97914	23
38	9.48133	39	9.50223	43	10.49777	9.97910	22
39	9.48173	40	9.50267	44	10.49733	9.97906	21
40	9.48213	40	9.50311	44	10.49689	9.97902	20
41	9.48252	39	9.50355	44	10.49645	9.97898	19
42	9.48292	40	9.50398	43	10.49602	9.97894	18
43	9.48332	40	9.50442	44	10.49558	9.97890	17
44	9.48371	39	9.50485	43	10.49515	9.97886	16
45	9.48411	40	9.50529	44	10.49471	9.97882	15
46	9.48450	39	9.50572	43	10.49428	9.97878	14
47	9.48490	40	9.50616	44	10.49384	9.97874	13
48	9.48529	39	9.50659	43	10.49341	9.97870	12
49	9.48568	39	9.50703	44	10.49297	9.97866	11
50	9.48607	39	9.50746	43	10.49254	9.97861	10
51	9.48647	40	9.50789	43	10.49211	9.97857	9
52	9.48686	39	9.50833	44	10.49167	9.97853	8
53	9.48725	39	9.50876	43	10.49124	9.97849	7
54	9.48764	39	9.50919	43	10.49081	9.97845	6
55	9.48803	39	9.50962	43	10.49038	9.97841	5
56	9.48842	39	9.51005	43	10.48995	9.97837	4
57	9.48881	39	9.51048	43	10.48952	9.97833	3
58	9.48920	39	9.51092	44	10.48908	9.97829	2
59	9.48959	39	9.51135	43	10.48865	9.97825	1
60	9.48998	39	9.51178	43	10.48822	9.97821	0
	Cof.		Cot.		Tang.	Sin.	

72 Degrees.

17 Degrees.

18 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.48998	39	9.51178	43	10.48822	9.97821	4	60
1	9.49037	39	9.51221	43	10.48779	9.97817	5	59
2	9.49076	39	9.51264	42	10.48736	9.97812	4	58
3	9.49115	38	9.51306	43	10.48694	9.97808	4	57
4	9.49153	39	9.51349	43	10.48651	9.97804	4	56
5	9.49192	39	9.51392	43	10.48608	9.97800	4	55
6	9.49231	38	9.51435	43	10.48565	9.97796	4	54
7	9.49269	39	9.51478	42	10.48522	9.97792	4	53
8	9.49308	39	9.51520	43	10.48480	9.97788	4	52
9	9.49347	38	9.51563	43	10.48437	9.97784	5	51
10	9.49385	39	9.51606	42	10.48394	9.97779	4	50
11	9.49424	38	9.51648	43	10.48352	9.97775	4	49
12	9.49462	38	9.51691	43	10.48309	9.97771	4	48
13	9.49500	39	9.51734	42	10.48266	9.97767	4	47
14	9.49539	38	9.51776	43	10.48224	9.97763	4	46
15	9.49577	38	9.51819	42	10.48181	9.97759	5	45
16	9.49615	39	9.51861	42	10.48139	9.97754	4	44
17	9.49654	38	9.51903	43	10.48097	9.97750	4	43
18	9.49692	38	9.51946	42	10.48054	9.97746	4	42
19	9.49730	38	9.51988	43	10.48012	9.97742	4	41
20	9.49768	38	9.52031	42	10.47969	9.97738	4	40
21	9.49806	38	9.52073	42	10.47927	9.97734	5	39
22	9.49844	38	9.52115	42	10.47885	9.97729	4	38
23	9.49882	38	9.52157	43	10.47843	9.97725	4	37
24	9.49920	38	9.52200	42	10.47800	9.97721	4	36
25	9.49958	38	9.52242	42	10.47758	9.97717	4	35
26	9.49996	38	9.52284	42	10.47716	9.97713	5	34
27	9.50034	38	9.52326	42	10.47674	9.97708	4	33
28	9.50072	38	9.52368	42	10.47632	9.97704	4	32
29	9.50110	38	9.52410	42	10.47590	9.97700	4	31
30	9.50148	37	9.52452	42	10.47548	9.97696	5	30
31	9.50185	38	9.52494	42	10.47506	9.97691	4	29
32	9.50223	38	9.52536	42	10.47464	9.97687	4	28
33	9.50261	38	9.52578	42	10.47422	9.97683	4	27
34	9.50298	37	9.52620	41	10.47380	9.97679	5	26
35	9.50336	38	9.52661	42	10.47339	9.97674	4	25
36	9.50374	37	9.52703	42	10.47297	9.97670	4	24
37	9.50411	38	9.52745	42	10.47255	9.97666	4	23
38	9.50449	37	9.52787	42	10.47213	9.97662	5	22
39	9.50486	37	9.52829	41	10.47171	9.97657	4	21
40	9.50523	38	9.52870	42	10.47130	9.97653	4	20
41	9.50561	37	9.52912	41	10.47088	9.97649	4	19
42	9.50598	37	9.52953	42	10.47047	9.97645	5	18
43	9.50635	37	9.52995	42	10.47005	9.97640	4	17
44	9.50673	38	9.53037	41	10.46963	9.97636	4	16
45	9.50710	37	9.53078	42	10.46922	9.97632	4	15
46	9.50747	37	9.53120	41	10.46880	9.97628	5	14
47	9.50784	37	9.53161	41	10.46839	9.97623	4	13
48	9.50821	37	9.53202	42	10.46798	9.97619	4	12
49	9.50858	38	9.53244	41	10.46756	9.97615	5	11
50	9.50896	37	9.53285	42	10.46715	9.97610	4	10
51	9.50933	37	9.53327	41	10.46673	9.97606	4	9
52	9.50970	37	9.53368	41	10.46632	9.97602	5	8
53	9.51007	37	9.53409	41	10.46591	9.97597	4	7
54	9.51043	36	9.53450	42	10.46550	9.97593	4	6
55	9.51080	37	9.53492	41	10.46508	9.97589	5	5
56	9.51117	37	9.53533	41	10.46467	9.97584	4	4
57	9.51154	37	9.53574	41	10.46426	9.97580	4	3
58	9.51191	37	9.53615	41	10.46385	9.97576	5	2
59	9.51227	36	9.53656	41	10.46344	9.97571	4	1
60	9.51264	37	9.53697	41	10.46303	9.97567	4	0
	Cof.		Cot.		Tang.	Sin.		

71 Degrees.

19 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.51264	37	9.53697	41	10.46303	9.97567	4	60
1	9.51301	37	9.53738	41	10.46262	9.97563	4	59
2	9.51338	37	9.53779	41	10.46221	9.97558	5	58
3	9.51374	36	9.53820	41	10.46180	9.97554	4	57
4	9.51411	37	9.53861	41	10.46139	9.97550	4	56
5	9.51447	36	9.53902	41	10.46098	9.97545	5	55
6	9.51484	37	9.53943	41	10.46057	9.97541	4	54
7	9.51520	36	9.53984	41	10.46016	9.97536	5	53
8	9.51557	37	9.54025	40	10.45975	9.97532	4	52
9	9.51593	36	9.54065	41	10.45935	9.97528	5	51
10	9.51629	37	9.54106	41	10.45894	9.97523	4	50
11	9.51666	36	9.54147	40	10.45853	9.97519	4	49
12	9.51702	36	9.54187	41	10.45813	9.97515	5	48
13	9.51738	36	9.54228	41	10.45772	9.97510	4	47
14	9.51774	36	9.54269	40	10.45731	9.97506	5	46
15	9.51811	36	9.54309	41	10.45691	9.97501	4	45
16	9.51847	36	9.54350	40	10.45650	9.97497	5	44
17	9.51883	36	9.54390	41	10.45610	9.97492	4	43
18	9.51919	36	9.54431	40	10.45569	9.97488	4	42
19	9.51955	36	9.54471	41	10.45529	9.97484	5	41
20	9.51991	36	9.54512	40	10.45488	9.97479	4	40
21	9.52027	36	9.54552	41	10.45448	9.97475	5	39
22	9.52063	36	9.54593	40	10.45407	9.97470	4	38
23	9.52099	36	9.54633	40	10.45367	9.97466	5	37
24	9.52135	36	9.54673	41	10.45327	9.97461	4	36
25	9.52171	36	9.54714	40	10.45286	9.97457	4	35
26	9.52207	35	9.54754	40	10.45246	9.97453	5	34
27	9.52242	36	9.54794	41	10.45206	9.97448	4	33
28	9.52278	36	9.54835	40	10.45165	9.97444	5	32
29	9.52314	36	9.54875	40	10.45125	9.97439	4	31
30	9.52350	35	9.54915	40	10.45085	9.97435	5	30
31	9.52385	36	9.54955	40	10.45045	9.97430	4	29
32	9.52421	35	9.54995	40	10.45005	9.97426	4	28
33	9.52456	36	9.55035	40	10.44965	9.97421	5	27
34	9.52492	35	9.55075	40	10.44925	9.97417	4	26
35	9.52527	36	9.55115	40	10.44885	9.97412	5	25
36	9.52563	35	9.55155	40	10.44845	9.97408	4	24
37	9.52598	36	9.55195	40	10.44805	9.97403	5	23
38	9.52634	35	9.55235	40	10.44765	9.97399	4	22
39	9.52669	36	9.55275	40	10.44725	9.97394	5	21
40	9.52705	35	9.55315	40	10.44685	9.97390	4	20
41	9.52740	35	9.55355	40	10.44645	9.97385	4	19
42	9.52775	35	9.55395	39	10.44605	9.97381	5	18
43	9.52811	36	9.55434	40	10.44566	9.97376	4	17
44	9.52846	35	9.55474	40	10.44526	9.97372	4	16
45	9.52881	35	9.55514	40	10.44486	9.97367	5	15
46	9.52916	35	9.55554	39	10.44446	9.97363	4	14
47	9.52951	35	9.55593	40	10.44407	9.97359	5	13
48	9.52986	35	9.55633	40	10.44367	9.97353	5	12
49	9.53021	35	9.55673	39	10.44327	9.97349	4	11
50	9.53056	35	9.55712	40	10.44288	9.97344	4	10
51	9.53092	34	9.55752	39	10.44248	9.97340	5	9
52	9.53126	35	9.55791	40	10.44209	9.97335	4	8
53	9.53161	35	9.55831	39	10.44169	9.97331	5	7
54	9.53196	35	9.55870	40	10.44130	9.97326	4	6
55	9.53231	35	9.55910	39	10.44090	9.97322	5	5
56	9.53266	35	9.55949	40	10.44051	9.97317	5	4
57	9.53301	35	9.55989	40	10.44011	9.97313	4	3
58	9.53336	35	9.56028	39	10.43972	9.97308	4	2
59	9.53370	34	9.56067	39	10.43933	9.97303	5	1
60	9.53405	35	9.56107	40	10.43893	9.97299	4	0
	Cof.		Cot.		Tang.	Sin.		

70 Degrees.

20 Degrees.							
′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9·53405	35	9·56107	39	10.43893	9.97299	5	60
1	9·53440	35	9·56146	39	10.43854	9.97294	5	59
2	9·53475	34	9·56185	39	10.43815	9.97289	4	58
3	9·53509	35	9·56224	40	10.43776	9.97285	5	57
4	9·53544	34	9·56264	39	10.43736	9.97280	4	56
5	9·53578	35	9·56303	39	10.43697	9.97276	5	55
6	9·53613	34	9·56342	39	10.43658	9.97271	5	54
7	9·53647	35	9·56381	39	10.43619	9.97266	4	53
8	9·53682	34	9·56420	39	10.43580	9.97262	5	52
9	9·53716	35	9·56459	39	10.43541	9.97257	5	51
10	9·53751	34	9·56498	39	10.43502	9.97252	4	50
11	9·53785	34	9·56537	39	10.43463	9.97248	5	49
12	9·53819	35	9·56576	39	10.43424	9.97243	5	48
13	9·53854	34	9·56615	39	10.43385	9.97238	4	47
14	9·53888	34	9·56654	39	10.43346	9.97234	5	46
15	9·53922	35	9·56693	39	10.43307	9.97229	5	45
16	9·53957	34	9·56732	39	10.43268	9.97224	4	44
17	9·53991	34	9·56771	39	10.43229	9.97220	5	43
18	9·54025	34	9·56810	39	10.43190	9.97215	5	42
19	9·54059	34	9·56849	38	10.43151	9.97210	4	41
20	9·54093	34	9·56887	39	10.43113	9.97206	5	40
21	9·54127	34	9·56926	39	10.43074	9.97201	5	39
22	9·54161	34	9·56965	39	10.43035	9.97196	4	38
23	9·54195	34	9·57004	38	10.42996	9.97192	5	37
24	9·54229	34	9·57042	39	10.42958	9.97187	5	36
25	9·54263	34	9·57081	39	10.42919	9.97182	4	35
26	9·54297	34	9·57120	38	10.42880	9.97178	5	34
27	9·54331	34	9·57158	39	10.42842	9.97173	5	33
28	9·54365	34	9·57197	38	10.42803	9.97168	5	32
29	9·54399	34	9·57235	39	10.42765	9.97163	4	31
30	9·54433	33	9·57274	38	10.42726	9.97159	5	30
31	9·54466	34	9·57312	39	10.42688	9.97154	5	29
32	9·54500	34	9·57351	38	10.42649	9.97149	4	28
33	9·54534	33	9·57389	39	10.42611	9.97145	5	27
34	9·54567	34	9·57428	38	10.42572	9.97140	5	26
35	9·54601	34	9·57466	38	10.42534	9.97135	5	25
36	9·54635	33	9·57504	39	10.42496	9.97130	4	24
37	9·54668	34	9·57543	38	10.42457	9.97126	5	23
38	9·54702	33	9·57581	38	10.42419	9.97121	5	22
39	9·54735	34	9·57619	39	10.42381	9.97116	5	21
40	9·54769	33	9·57658	38	10.42342	9.97111	5	20
41	9·54802	34	9·57696	38	10.42304	9.97107	4	19
42	9·54836	33	9·57734	38	10.42266	9.97102	5	18
43	9·54869	34	9·57772	38	10.42228	9.97097	5	17
44	9·54903	33	9·57810	39	10.42190	9.97092	5	16
45	9·54936	33	9·57849	38	10.42151	9.97087	5	15
46	9·54969	34	9·57887	38	10.42113	9.97083	4	14
47	9·55003	33	9·57925	38	10.42075	9.97078	5	13
48	9·55036	33	9·57963	38	10.42037	9.97073	5	12
49	9·55069	33	9·58001	38	10.41999	9.97068	5	11
50	9·55102	33	9·58039	38	10.41961	9.97063	5	10
51	9·55136	33	9·58077	38	10.41923	9.97059	5	9
52	9·55169	33	9·58115	38	10.41885	9.97054	5	8
53	9·55202	33	9·58153	38	10.41847	9.97049	5	7
54	9·55235	33	9·58191	38	10.41809	9.97044	5	6
55	9·55268	33	9·58229	38	10.41771	9.97039	5	5
56	9·55301	33	9·58267	37	10.41733	9.97035	4	4
57	9·55334	33	9·58304	38	10.41696	9.97030	5	3
58	9·55367	33	9·58342	38	10.41658	9.97025	5	2
59	9·55400	33	9·58380	38	10.41620	9.97020	5	1
60	9·55433	33	9·58418	33	10.41582	9.97015	5	0
	Cof.		Cot.		Tang.	Sin.		
69 Degrees.								

21 Degrees.							
′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9·55433	33	9·58418	37	10.41582	9.97015	5	60
1	9·55466	33	9·58455	38	10.41545	9.97010	5	59
2	9·55499	33	9·58493	38	10.41507	9.97005	5	58
3	9·55532	33	9·58531	38	10.41469	9.97001	4	57
4	9·55564	32	9·58569	38	10.41431	9.96996	5	56
5	9·55597	33	9·58606	37	10.41394	9.96991	5	55
6	9·55630	33	9·58644	38	10.41356	9.96986	5	54
7	9·55663	32	9·58681	37	10.41319	9.96981	5	53
8	9·55695	33	9·58719	38	10.41281	9.96976	5	52
9	9·55728	33	9·58757	37	10.41243	9.96971	5	51
10	9·55761	33	9·58794	38	10.41206	9.96966	5	50
11	9·55793	32	9·58832	37	10.41168	9.96962	4	49
12	9·55826	33	9·58869	38	10.41131	9.96957	5	48
13	9·55858	32	9·58907	37	10.41093	9.96952	5	47
14	9·55891	33	9·58944	37	10.41056	9.96947	5	46
15	9·55923	33	9·58981	38	10.41019	9.96942	5	45
16	9·55956	32	9·59019	37	10.40981	9.96937	5	44
17	9·55988	33	9·59056	38	10.40944	9.96932	5	43
18	9·56021	32	9·59094	37	10.40906	9.96927	5	42
19	9·56053	32	9·59131	37	10.40869	9.96922	5	41
20	9·56085	33	9·59168	37	10.40832	9.96917	5	40
21	9·56118	32	9·59205	38	10.40795	9.96912	5	39
22	9·56150	32	9·59243	37	10.40757	9.96907	5	38
23	9·56182	33	9·59280	37	10.40720	9.96903	4	37
24	9·56215	32	9·59317	37	10.40683	9.96898	5	36
25	9·56247	32	9·59354	37	10.40646	9.96893	5	35
26	9·56279	32	9·59391	38	10.40609	9.96888	5	34
27	9·56311	32	9·59429	37	10.40571	9.96883	5	33
28	9·56343	32	9·59466	37	10.40534	9.96878	5	32
29	9·56375	32	9·59503	37	10.40497	9.96873	5	31
30	9·56408	33	9·59540	37	10.40460	9.96868	5	30
31	9·56440	32	9·59577	37	10.40423	9.96863	5	29
32	9·56472	32	9·59614	37	10.40386	9.96858	5	28
33	9·56504	32	9·5965	37	10.40349	9.96853	5	27
34	9·56536	32	9·59688	37	10.40312	9.96848	5	26
35	9·56568	31	9·59725	37	10.40275	9.96843	5	25
36	9·56599	32	9·59762	37	10.40238	9.96838	5	24
37	9·56631	32	9·59799	36	10.40201	9.96833	5	23
38	9·56663	32	9·59835	37	10.40165	9.96828	5	22
39	9·56695	32	9·59872	37	10.40128	9.96823	5	21
40	9·56727	32	9·59909	37	10.40091	9.96818	5	20
41	9·56759	31	9·59946	37	10.40054	9.96813	5	19
42	9·56790	32	9·59983	36	10.40017	9.96808	5	18
43	9·56822	32	9·60019	37	10.39981	9.96803	5	17
44	9·56854	32	9·60056	37	10.39944	9.96798	5	16
45	9·56886	32	9·60093	37	10.39907	9.96793	5	15
46	9·56917	31	9·60130	37	10.39870	9.96788	5	14
47	9·56949	32	9·60166	36	10.39834	9.96783	5	13
48	9·56980	31	9·60203	37	10.39797	9.96778	5	12
49	9·57012	32	9·60240	37	10.39760	9.96772	6	11
50	9·57044	32	9·60276	36	10.39724	9.96767	5	10
51	9·57075	32	9·60313	36	10.39687	9.96762	5	9
52	9·57107	31	9·60349	37	10.39651	9.96757	5	8
53	9·57138	31	9·60386	36	10.39614	9.96752	5	7
54	9·57169	32	9·60422	37	10.39578	9.96747	5	6
55	9·57201	31	9·60459	36	10.39541	9.96742	5	5
56	9·57232	32	9·60495	37	10.39505	9.96737	5	4
57	9·57264	31	9·60532	36	10.39468	9.96732	5	3
58	9·57295	31	9·60568	37	10.39432	9.96727	5	2
59	9·57326	32	9·60605	36	10.39395	9.96722	5	1
60	9·57358	32	9·60641	36	10.39359	9.96717	5	0
	Cof.		Cot.		Tang.	Sin.		
68 Degrees.								

22 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9 57358		9.60641		10.39359	9.96717		60
1	9.57389	31	9.60677	36	10.39323	9.96711	6	59
2	9 57420	31	9.60714	37	10.39286	9.96706	5	58
3	9.57451	31	9.60750	36	10.39250	9.96701	5	57
4	9.57482	31	9.60786	36	10.39214	9 96696	5	56
5	9.57514	32	9.60823	37	10.39177	9.96691	5	55
6	9.57545	31	9.60859	36	10.39141	9.96686	5	54
7	9.57576	31	9.60895	36	10.39105	9.96681	5	53
8	9.57607	31	9.60931	36	10.39069	9.96676	5	52
9	9.57638	31	9.60967	36	10.39033	9.96670	6	51
10	9.57669	31	9.61004	37	10.38996	9.96665	5	50
11	9.57700	31	9.61040	36	10.38960	9.96660	5	49
12	9.57731	31	9.61076	36	10.38924	9.96655	5	48
13	9.57762	31	9.61112	36	10.38888	9.96650	5	47
14	9.57793	31	9.61148	36	10.38852	9.96645	5	46
15	9.57824	31	9.61184	36	10.38816	9.96640	5	45
16	9.57855	31	9.61220	36	10.38780	9.96634	6	44
17	9.57885	30	9.61256	36	10.38744	9.96629	5	43
18	9.57916	31	9.61292	36	10.38708	9.96624	5	42
19	9.57947	31	9.61328	36	10.38672	9 96619	5	41
20	9.57978	31	9 61364	36	10 38636	9 96614	5	40
21	9.58008	30	9.61400	36	10.38600	9 96608	6	39
22	9.58039	31	9.61436	36	10.38564	9.96603	5	38
23	9.58070	31	9.61472	36	10.38528	9 96598	5	37
24	9.58101	31	9.61508	36	0.38492	9 96593	5	36
25	9.58131	30	9 61544	35	10 38456	9 96588	5	35
26	9.58162	31	9.61579	36	10.38421	9.96582	6	34
27	9.58192	30	9.61615	36	10.38385	9 96577	5	33
28	9.58223	31	9 61651	36	10.38349	9.96572	5	32
29	9.58253	30	9.61687	35	10.38313	9 96567	5	31
30	9.58284	31	9.61722	36	10.38278	9 96562	5	30
31	9.58314	30	9 61758	36	10.38242	9 96556	6	29
32	9.58345	31	9 61794	36	10.38206	9.96551	5	28
33	9.58375	30	9.61830	35	10.38170	9.96546	5	27
34	9.58406	31	9.61865	36	10.38135	9.96541	5	26
35	9.58436	30	9 61901	35	10.38099	9.96535	6	25
36	9.58467	31	9 61936	36	10.38064	9 96530	5	24
37	9.58497	30	9.61972	36	10.38028	9 96525	5	23
38	9.58527	30	9.62008	36	10.37992	9 96520	5	22
39	9.58557	30	9.62043	35	10.37957	9.96514	6	21
40	9.58588	31	9 62079	36	10.37921	9 96509	5	20
41	9 58618	30	9.62114	35	10.37886	9.96504	5	19
42	9.58648	30	9 62150	36	10 37850	9 96498	6	18
43	9.58678	30	9.62185	35	10.37815	9.96493	5	17
44	9.58709	31	9.62221	36	10.37779	9.96488	5	16
45	9 58739	30	9.62256	35	10.37744	9.96483	5	15
46	9.58769	30	9.62292	36	10.37708	9 96477	6	14
47	9.58799	30	9 62327	35	10 37673	9.96472	5	13
48	9.58829	30	9 62362	35	10 37638	9 96467	5	12
49	9.58859	30	9.62398	36	10.37602	9 96461	6	11
50	9.58889	30	9.62433	35	10 37567	9.96456	5	10
51	9.58919	30	9.62468	35	10.37532	9 96451	5	9
52	9.58949	30	9.62504	36	10.37496	9 96445	6	8
53	9.58979	30	9 62539	35	10.37461	9 96440	5	7
54	9.59009	30	9 62574	35	10.37426	9.96435	5	6
55	9.59039	30	9.62609	35	10.37391	9 96429	6	5
56	9.59069	30	9 62645	36	10.37355	9.96424	5	4
57	9.59098	29	9 62680	35	10.37320	9 96419	5	3
58	9.59128	30	9 62715	35	10.37285	9.96413	6	2
59	9.59158	30	9.62750	35	10.37250	9.96408	5	1
60	9.59188	30	9.62785	35	10.37215	9.96403	5	0
	Cof.		Cot.		Tang.	Sin.		

67 Degrees.

23 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.59188		9.62785		10.37215	9.96403	5	60
1	9.59218	30	9.62820	35	10.37180	9.96397	6	59
2	9.59247	29	9.62855	35	10.37145	9.96392	5	58
3	9.59277	30	9.62890	35	10.37110	9.96387	5	57
4	9.59307	30	9.62926	36	10.37074	9.96381	6	56
5	9.59336	29	9.62961	35	10.37039	9.96376	5	55
6	9.59366	30	9.62996	35	10.37004	9.96370	6	54
7	9.59396	30	9.63031	35	10.36969	9.96365	5	53
8	9.59425	29	9.63066	35	10.36934	9.96360	5	52
9	9.59455	30	9.63101	35	10.36899	9.96354	6	51
10	9.59484	29	9.63135	34	10.36865	9.96349	5	50
11	9.59514	30	9.63170	35	10.36830	9.96343	6	49
12	9.59543	29	9.63205	35	10.36795	9.96338	5	48
13	9 59573	30	9.63240	35	10.36760	9.96333	5	47
14	9.59602	29	9.63275	35	10.36725	9.96327	6	46
15	9.59632	30	9.63310	35	10.36690	9.96322	5	45
16	9.59661	29	9 63345	35	10.36655	9.96316	6	44
17	9 59690	29	9.63379	34	10.36621	9.96311	5	43
18	9.59720	30	9.63414	35	10.36586	9.96305	6	42
19	9.59749	29	9.63449	35	10.36551	9.96300	5	41
20	9 59778	29	9 63484	35	10.36516	9.96294	6	40
21	9.59808	30	9.63519	35	10.36481	9 96289	5	39
22	9.59837	29	9 63553	34	10.36447	9.96284	5	38
23	9.59866	29	9.63588	35	10.36412	9 96278	6	37
24	9.59895	29	9.63623	35	10.36377	9.96273	5	36
25	9.59924	29	9.63657	34	10.36343	9.96267	6	35
26	9.59954	30	9.63692	35	10.36308	9.96262	5	34
27	9.59983	29	9 63726	34	10.36274	9.96256	6	33
28	9.60012	29	9.63761	35	10.36239	9.96251	5	32
29	9.60041	29	9.63796	35	10.36204	9.96245	6	31
30	9.60070	29	9.63830	34	10.36170	9 96240	5	30
31	9 60099	29	9.63865	35	10.36135	9.96234	6	29
32	9.60128	29	9.63899	34	10.36101	9.96229	5	28
33	9.60157	29	9.63934	35	10.36066	9.96223	6	27
34	9 60186	29	9.63968	34	10.36032	9.96218	5	26
35	9.60215	29	9.64003	35	10.35997	9.96212	6	25
36	9.60244	29	9.64037	34	10.35963	9.96207	5	24
37	9.60273	29	9.64072	35	10.35928	9.96201	6	23
38	9.60302	29	9.64106	34	10.35894	9.96196	5	22
39	9.60331	29	9.64140	34	10.35860	9.96190	6	21
40	9.60359	28	9.64175	35	10.35825	9.96185	5	20
41	9 60388	29	9.64209	34	10.35791	9.96179	6	19
42	9.60417	29	9.64243	34	10.35757	9.96174	5	18
43	9.60446	29	9.64278	35	10.35722	9.96168	6	17
44	9.60474	28	9.64312	34	10.35688	9.96162	5	16
45	9.60503	29	9.64346	34	10.35654	9.96157	6	15
46	9.60532	29	9 64381	35	10.35619	9.96151	6	14
47	9.60561	29	9.64415	34	10.35585	9.96146	5	13
48	9.60589	28	9.64449	34	10.35551	9.96140	6	12
49	9.60618	29	9.64483	34	10.35517	9.96135	5	11
50	9.60646	28	9.64517	34	10.35483	9.96129	6	10
51	9 60675	29	9.64552	35	10.35448	9.96123	6	9
52	9.60704	29	9.64586	34	10.35414	9.96118	5	8
53	9.60732	28	9.64620	34	10.35380	9.96112	6	7
54	9.60761	29	9.64654	34	10.35346	9.96107	5	6
55	9.60789	28	9.64688	34	10.35312	9.96101	6	5
56	9.60818	29	9.64722	34	10.35278	9.96095	6	4
57	9.60846	28	9.64756	34	10.35244	9.96090	5	3
58	9.60875	29	9.64790	34	10.35210	9.96084	6	2
59	9.60903	28	9.64824	34	10.35176	9.96079	5	1
60	9.60931	28	9.64858	34	10.35142	9.96073	6	0
	Cof.		Cot.		Tang.	Sin.		

66 Degrees.

24 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.60941	29	9.64858	34	10.35142	9.96073	6	60
1	9.60960	28	9.64892	34	10.35108	9.96067	5	59
2	9.60988	28	9.64926	34	10.35074	9.96062	6	58
3	9.61016	29	9.64960	34	10.35040	9.96056	6	57
4	9.61045	28	9.64994	34	10.35006	9.96050	5	56
5	9.61073	28	9.65028	34	10.34972	9.96045	6	55
6	9.61101	28	9.65062	34	10.34938	9 96039	5	54
7	9.61129	20	9.65096	34	10.34904	9.96034	6	53
8	9.61158	28	9.65130	34	10.34870	9.96028	6	52
9	9.61186	28	9.65164	33	10.34836	9.96022	5	51
10	9.61214	28	9.65197	34	10.34803	9.96017	6	50
11	9.61242	28	9.65231	34	10.34769	9.96011	6	49
12	9.61270	28	9.65265	34	10.34735	9.96005	5	48
13	9.61298	28	9.65299	34	10.34701	9.96000	6	47
14	9.61326	28	9.65333	33	10.34667	9.95994	6	46
15	9.61354	28	9.65366	34	10.34634	9.95988	6	45
16	9.61382	29	9.65400	34	10.34600	9.95982	5	44
17	9.61411	27	9.65434	33	10.34566	9.95977	6	43
18	9.61438	28	9.65467	34	10.34533	9.95971	6	42
19	9.61466	28	9.65501	34	10.34499	9.95965	5	41
20	9.61494	28	9.65535	33	10.34465	9.95960	6	40
21	9.61522	28	9.65568	34	10.34432	9.95954	6	39
22	9.61550	28	9.65602	34	10.34398	9.95948	6	38
23	9.61578	28	9.65636	33	10.34364	9.95942	5	37
24	9.61606	28	9.65669	34	10.34331	9.95937	6	36
25	9.61634	28	9.65703	33	10.34297	9.95931	6	35
26	9.61662	27	9 65736	34	10.34264	9.95925	5	34
27	9.61689	28	9.65770	33	10.34230	9.95920	6	33
28	9.61717	28	9.65803	34	10.34197	9.95914	6	32
29	9.61745	28	9.65837	33	10.34163	9.95908	6	31
30	9.61773	27	9.65870	34	10.34130	9.95902	5	30
31	9.61800	28	9.65904	33	10.34096	9.95897	6	29
32	9.61828	28	9.65937	34	10.34063	9.95891	6	28
33	9.61856	27	9.65971	33	10.34029	9.95885	6	27
34	9.61883	28	9.66004	34	10.33996	9.95879	6	26
35	9.61911	28	9.66038	33	10.33962	9.95873	5	25
36	9.61939	27	9.66071	33	10.33929	9.95868	6	24
37	9.61966	28	9.66104	34	10.33896	9.95862	6	23
38	9.61994	27	9.66138	33	10.33862	9.95856	6	22
39	9.62021	28	9.66171	33	10.33829	9.95850	6	21
40	9.62049	27	9.66204	34	10.33796	9.95844	5	20
41	9.62079	28	9.66238	33	10.33762	9.95839	6	19
42	9.62104	27	9.66271	33	10.33729	9.95833	6	18
43	9.62131	28	9.66304	33	10.33696	9.95827	6	17
44	9.62159	27	9.66337	33	10.33663	9.95821	6	16
45	9.62186	28	9.66371	33	10.33629	9.95815	5	15
46	9.62214	27	9.66404	33	10.33596	9.95810	6	14
47	9.62241	27	9.66437	33	10.33563	9.95804	6	13
48	9.62268	28	9.66470	33	10.33530	9.95798	6	12
49	9.62296	27	9.66503	34	10.33497	9.95792	6	11
50	9.62323	27	9.66537	33	10.33463	9.95786	6	10
51	9.62350	27	9.66570	33	10.33430	9.95780	5	9
52	9.62377	27	9.66603	33	10.33397	9.95775	6	8
53	9.62405	28	9.66636	33	10.33364	9.95769	6	7
54	9.62432	27	9.66669	33	10.33331	9.95763	6	6
55	9.62459	27	9.66702	33	10.33298	9.95757	6	5
56	9.62486	27	9.66735	33	10.33265	9.95751	6	4
57	9.62513	27	9.66768	33	10.33232	9.95745	6	3
58	9.62541	28	9.66801	33	10.33199	9.95739	6	2
59	9.62568	27	9.66834	33	10.33166	9.95733	5	1
60	9.62595	27	9.66867	33	10.33133	9.95728		0
	Cof.		Cot.		Tang.	Sin.		

65 Degrees.

25 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.62595	27	9.66867	33	10.33133	9.95728	6	60
1	9.62622	27	9.66900	33	10.33100	9.95722	6	59
2	9.62649	27	9.66933	33	10.33067	9.95716	6	58
3	9.62676	27	9.66966	33	10.33034	9.95710	6	57
4	9.62703	27	9.66999	33	10.33001	9.95704	6	56
5	9.62730	27	9.67032	33	10.32968	9.95698	6	55
6	9.62757	27	9.67065	33	10.32935	9.95692	6	54
7	9.62784	27	9.67098	33	10.32902	9.95686	6	53
8	9.62811	27	9.67131	33	10.32869	9.95680	6	52
9	9.62838	27	9.67163	32	10.32837	9.95674	6	51
10	9.62865	27	9.67196	33	10.32804	9.95668	5	50
11	9.62892	26	9.67229	33	10.32771	9.95663	6	49
12	9.62918	27	9.67262	33	10.32738	9.95657	6	48
13	9.62945	27	9.67295	32	10.32705	9.95651	6	47
14	9.62972	27	9.67327	33	10.32673	9.95645	6	46
15	9.62999	27	9.67360	33	10.32740	9.95639	6	45
16	9.63026	26	9.67393	33	10.32607	9.95633	6	44
17	9.63052	27	9.67426	32	10.32574	9.95627	6	43
18	9.63079	27	9.67458	33	10.32542	9.95621	6	42
19	9.63106	27	9.67491	33	10.32509	9.95615	6	41
20	9.63133	26	9.67524	32	10.32476	9.95609	6	40
21	9.63159	27	9.67556	33	10.32444	9.95603	6	39
22	9.63186	27	9.67589	33	10.32411	9.95597	6	38
23	9.63213	26	9.67622	32	10.32378	9.95591	6	37
24	9.63239	27	9.67654	33	10.32346	9.95585	6	36
25	9.63266	26	9.67687	32	10.32313	9.95579	6	35
26	9.63292	27	9.67719	33	10.32281	9.95573	6	34
27	9.63319	26	9.67752	33	10.32248	9.95567	6	33
28	9.63345	27	9.67785	32	10.32215	9.95561	6	32
29	9.63372	26	9.67817	33	10.32183	9.95555	6	31
30	9.63398	27	9.67850	32	10.32150	9.95549	6	30
31	9.63425	26	9.67882	33	10.32118	9.95543	6	29
32	9.63451	27	9.67915	32	10.32085	9.95537	6	28
33	9.63478	26	9.67947	33	10.32053	9.95531	6	27
34	9.63504	27	9.67980	32	10.32020	9.95525	6	26
35	9.63531	26	9.68012	32	10.31988	9.95519	6	25
36	9.63557	26	9.68044	33	10.31956	9.95513	6	24
37	9.63583	27	9.68077	32	10.31923	9.95507	7	23
38	9.63610	26	9.68109	33	10.31891	9.95500	6	22
39	9.63636	26	9.68142	32	10.31858	9.95494	6	21
40	9.63662	27	9.68174	32	10.31826	9.95488	6	20
41	9.63689	26	9.68206	33	10.31794	9.95482	6	19
42	9.63715	26	9.68239	32	10.31761	9.95476	6	18
43	9.63741	26	9.68271	32	10.31729	9.95470	6	17
44	9.63767	26	9.68303	33	10.31697	9.95464	6	16
45	9.63794	27	9.68336	32	10.31664	9.95458	6	15
46	9.63820	26	9.68368	32	10.31632	9.95452	6	14
47	9.63846	26	9.68400	32	10.31600	9.95446	6	13
48	9.63872	26	9.68432	33	10.31568	9.95440	6	12
49	9.63898	26	9.68465	32	10.31535	9.95434	7	11
50	9.63924	26	9.68497	32	10.31503	9.95427	6	10
51	9.63950	26	9.68529	32	10.31471	9.93421	6	9
52	9.63976	26	9.62561	32	10.31439	9.95415	6	8
53	9.64002	26	9.68593	32	10.31407	9.95409	6	7
54	9.64028	26	9.68626	33	10.31374	9.95403	6	6
55	9.64054	26	9.68658	32	10.31342	9.95397	6	5
56	9.64080	26	9.68690	32	10.31310	9.95391	7	4
57	9.64106	26	9.68722	32	10.31278	9.95384	6	3
58	9.64132	26	9.68754	32	10.31246	9.95378	6	2
59	9.64158	26	9.68786	32	10.31214	9.95372	6	1
60	9.64184	26	9.68818	32	10.31182	9.95366		0
	Cof.		Cot.		Tang.	Sin.		

64 Degrees.

26 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.64184	26	9.68818	32	10.31182	9.95366	6	60
1	9.64210	26	9.68850	32	10.31150	9.95360	6	59
2	9.64236	26	9.68882	32	10.31118	9.95354	6	58
3	9.64262	26	9.68914	32	10.31086	9.95348	7	57
4	9.64288	25	9.68946	32	10.31054	9.95341	6	56
5	9.64313	26	9.68978	32	10.31022	9.95335	6	55
6	9.64339	26	9.69010	32	10.30990	9.95329	6	54
7	9.64365	26	9.69042	32	10.30958	9.95323	6	53
8	9.64391	26	9.69074	32	10.30926	9.95317	7	52
9	9.64417	26	9.69106	32	10.30894	9.95310	6	51
10	9.64442	25	9.69138	32	10.30862	9.95304	6	50
11	9.64468	26	9.69170	32	10.30830	9.95298	6	49
12	9.64494	26	9.69202	32	10.30798	9.95292	6	48
13	9.64519	25	9.69234	32	10.30766	9.95286	7	47
14	9.64545	26	9.69266	32	10.30734	9.95279	6	46
15	9.64571	26	9.69298	31	10.30702	9.95273	6	45
16	9.64596	25	9.69329	32	10.30671	9.95267	6	44
17	9.64622	26	9.69361	32	10.30639	9.95261	6	43
18	9.64647	25	9.69393	32	10.30607	9.95254	7	42
19	9.64673	26	9.69425	32	10.30575	9.95248	6	41
20	9.64698	25	9.69457	32	10.30543	9.95242	6	40
21	9.64724	26	9.69488	31	10.30512	9.95236	6	39
22	9.64749	25	9.69520	32	10.30480	9.95229	7	38
23	9.64775	26	9.69552	32	10.30448	9.95223	6	37
24	9.64800	25	9.69584	32	10.30416	9.95217	6	36
25	9.64826	26	9.69615	31	10.30385	9.95211	6	35
26	9.64851	25	9.69647	32	10.30353	9.95204	7	34
27	9.64877	26	9.69679	32	10.30321	9.95198	6	33
28	9.64902	25	9.69710	31	10.30290	9.95192	6	32
29	9.64927	25	9.69742	32	10.30258	9.95185	7	31
30	9.64953	26	9.69774	32	10.30226	9.95179	6	30
31	9.64978	25	9.69805	31	10.30195	9.95173	6	29
32	9.65003	25	9.69837	32	10.30163	9.95167	7	28
33	9.65029	26	9.69868	31	10.30132	9.95160	6	27
34	9.65054	25	9.69900	32	10.30100	9.95154	6	26
35	9.65079	25	9.69932	32	10.30068	9.95148	7	25
36	9.65104	25	9.69963	31	10.30037	9.95141	6	24
37	9.65130	26	9.69995	32	10.30005	9.95135	6	23
38	9.65155	25	9.70026	31	10.29974	9.95129	7	22
39	9.65180	25	9.70058	32	10.29942	9.95122	6	21
40	9.65205	25	9.70089	31	10.29911	9.95116	6	20
41	9.65230	25	9.70121	32	10.29879	9.95110	7	19
42	9.65255	25	9.70152	31	10.29848	9.95103	6	18
43	9.65281	26	9.70184	32	10.29816	9.95097	7	17
44	9.65306	25	9.70215	31	10.29785	9.95090	6	16
45	9.65331	25	9.70247	32	10.29753	9.95084	6	15
46	9.65356	25	9.70278	31	10.29722	9.95078	7	14
47	9.65381	25	9.70309	31	10.29691	9.95071	6	13
48	9.65406	25	9.70341	32	10.29659	9.95065	6	12
49	9.65431	25	9.70372	31	10.29628	9.95059	7	11
50	9.65456	25	9.70404	32	10.29596	9.95052	6	10
51	9.65481	25	9.70435	31	10.29565	9.95046	7	9
52	9.65506	25	9.70466	31	11.29534	9.95039	6	8
53	9.65531	25	9.70498	32	10.29502	9.95033	6	7
54	9.65556	25	9.70521	31	10.29471	9.95027	7	6
55	9.65580	24	9.70560	31	10.29440	9.95020	6	5
56	9.65605	25	9.70592	32	10.29408	9.95014	7	4
57	9.65630	25	9.70623	31	10.29377	9.95007	6	3
58	9.65655	25	9.70654	31	10.29346	9.95001	6	2
59	9.65680	25	9.70685	31	10.29315	9.94995	7	1
60	9.65705	25	9.70717	32	10.29283	9.94988	7	0
	Cof.		Cot.		Tang.	Sin.		

63 Degrees.

27 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.65705	24	9.70717	31	10.29283	9.94988	6	60
1	9.65729	25	9.70748	31	10.29252	9.94982	7	59
2	9.65754	25	9.70779	31	10.29221	9.94975	6	58
3	9.65779	25	9.70810	31	10.29190	9.94969	7	57
4	9.65804	24	9.70841	32	10.29159	9.94962	6	56
5	9.65828	25	9.70873	31	10.29127	9.94956	7	55
6	9.65853	25	9.70904	31	10.29096	9.94949	6	54
7	9.65878	24	9.70935	31	10.29065	9.94943	7	53
8	9.65902	25	9.70966	31	10.29034	9.94936	6	52
9	9.65927	25	9.70997	31	10.29003	9.94930	7	51
10	9.65952	24	9.71028	31	10.28972	9.94923	6	50
11	9.65976	25	9.71059	31	10.28941	9.94917	6	49
12	9.66001	24	9.71090	31	10.28910	9.94911	7	48
13	9.66025	25	9.71121	32	10.28879	9.94904	6	47
14	9.66050	25	9.71153	31	10.28847	9.94898	7	46
15	9.66075	24	9.71184	31	10.28816	9.94891	6	45
16	9.66099	25	9.71215	31	10.28785	9.94885	7	44
17	9.66124	24	9.71246	31	10.28754	9.94878	7	43
18	9.66148	25	9.71277	31	10.28723	9.94871	6	42
19	9.66173	24	9.71308	31	10.28692	9.94865	7	41
20	9.66197	24	9.71339	31	10.28661	9.94858	6	40
21	9.66221	25	9.71370	31	10.28630	9.94852	7	39
22	9.66246	24	9.71401	30	10.28599	9.94845	6	38
23	9.66270	25	9.71431	31	10.28569	9.94839	7	37
24	9.66295	24	9.71462	31	10.28538	9.94832	6	36
25	9.66319	24	9.71493	31	10.28507	9.94826	7	35
26	9.66343	25	9.71524	31	10.28476	9.94819	6	34
27	9.66368	24	9.71555	31	10.28445	9.94813	7	33
28	9.66392	24	9.71586	31	10.28414	9.94806	7	32
29	9.66416	25	9.71617	31	10.28383	9.94799	6	31
30	9.66441	24	9.71648	31	10.28352	9.94793	7	30
31	9.66465	24	9.71679	30	10.28321	9.94786	6	29
32	9.66489	24	9.71709	31	10.28291	9.94780	7	28
33	9.66513	24	9.71740	31	10.28260	9.94773	6	27
34	9.66537	25	9.71771	31	10.28229	9.94767	7	26
35	9.66562	24	9.71802	31	10.28198	9.94760	7	25
36	9.66586	24	9.71833	30	10.28167	9.94753	6	24
37	9.66610	24	9.71863	31	10.28137	9.94747	7	23
38	9.66634	24	9.71894	31	10.28106	9.94740	7	22
39	9.66658	24	9.71925	30	10.28075	9.94734	7	21
40	9.66682	24	9.71955	31	10.28045	9.94727	7	20
41	9.66706	25	9.71986	31	10.28014	9.94720	6	19
42	9.66731	24	9.72017	31	10.27983	9.94714	7	18
43	9.66755	24	9.72048	30	10.27952	9.94707	7	17
44	9.66779	24	9.72078	31	10.27922	9.94700	6	16
45	9.66803	24	9.72109	31	10.27891	9.94694	7	15
46	9.66827	24	9.72140	30	10.27860	9.94687	7	14
47	9.66851	24	9.72170	31	10.27830	9.94680	6	13
48	9.66875	24	9.72201	30	10.27799	9.94674	7	12
49	9.66899	24	9.72231	31	10.27769	9.94667	7	11
50	9.66922	23	9.72262	31	10.27738	9.94660	7	10
51	9.66946	24	9.72293	30	10.27707	9.94654	7	9
52	9.66970	24	9.72323	31	10.27677	9.94647	7	8
53	9.66994	24	9.72354	30	10.27646	9.94640	6	7
54	9.67018	24	9.72384	31	10.27616	9.94634	7	6
55	9.67042	24	9.72415	30	10.27585	9.94627	7	5
56	9.67066	24	9.72445	31	10.27555	9.94620	6	4
57	9.67090	24	9.72476	30	10.27524	9.94614	7	3
58	9.67113	23	9.72506	31	10.27494	9.94607	7	2
59	9.67137	24	9.72537	30	10.27463	9.94600	7	1
60	9.67161	24	9.72567	30	10.27433	9.94593	7	0
	Cof.		Cot.		Tang.	Sin.		

62 Degrees.

28 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cos.	D.	′
0	9.67161	24	9.72567	31	10.27433	9.94593	6	60
1	9.67185	23	9.72598	30	10.27402	9.94587	7	59
2	9.67208	24	9.72628	31	10.27372	9.94580	7	58
3	9.67232	24	9.72659	30	10.27341	9.94573	6	57
4	9.67256	24	9.72689	31	10.27311	9.94567	7	56
5	9.67280	23	9.72720	30	10.27280	9.94560	7	55
6	9.67303	24	9.72750	30	10.27250	9.94553	7	54
7	9.67327	23	9.72780	31	10.27220	9.94546	6	53
8	9.67350	24	9.72811	30	10.27189	9.94540	7	52
9	9.67374	24	9.72841	31	10.27159	9.94533	7	51
10	9.67398	23	9.72872	30	10.27128	9.94526	7	50
11	9.67421	24	9.72902	30	10.27098	9.94519	6	49
12	9.67445	23	9.72932	31	10.27068	9.94513	7	48
13	9.67468	24	9.72963	30	10.27037	9.94506	7	47
14	9.67492	23	9.72993	30	10.27007	9.94499	7	46
15	9.67515	24	9.73023	31	10.26977	9.94492	7	45
16	9.67539	23	9.73054	30	10.26946	9.94485	6	44
17	9.67562	24	9.73084	30	10.26916	9.94479	7	43
18	9.67586	23	9.73114	30	10.26886	9.94472	7	42
19	9.67609	24	9.73144	31	10.26856	9.94465	7	41
20	9.67633	23	9.73175	30	10.26825	9.94458	7	40
21	9.67656	24	9.73205	30	10.26795	9.94451	6	39
22	9.67680	23	9.73235	30	10.26765	9.94445	7	38
23	9.67703	23	9.73265	30	10.26735	9.94438	7	37
24	9.67726	24	9.73295	31	10.26705	9.94431	7	36
25	9.67750	23	9.73326	30	10.26674	9.94424	7	35
26	9.67773	23	9.73356	30	10.26644	9.94417	7	34
27	9.67796	24	9.73386	30	10.26614	9.94410	6	33
28	9.67820	23	9.73416	30	10.26584	9.94404	7	32
29	9.67843	23	9.73446	30	10.26554	9.94397	7	31
30	9.67866	24	9.73476	31	10.26524	9.94390	7	30
31	9.67890	23	9.73507	30	10.26493	9.94383	7	29
32	9.67913	23	9.73537	30	10.26463	9.94376	7	28
33	9.67936	23	9.73567	30	10.26433	9.94369	7	27
34	9.67959	23	9.73597	30	10.26403	9.94362	7	26
35	9.67982	24	9.73627	30	10.26373	9.94355	6	25
36	9.68006	23	9.73657	30	10.26343	9.94349	7	24
37	9.68029	23	9.73687	30	10.26313	9.94342	7	23
38	9.68052	23	9.73717	30	10.26283	9.94335	7	22
39	9.68075	23	9.73747	30	10.26253	9.94328	7	21
40	9.68098	23	9.73777	30	10.26223	9.94321	7	20
41	9.68121	23	9.73807	30	10.26193	9.94314	7	19
42	9.68144	23	9.73837	30	10.26163	9.94307	7	18
43	9.68167	23	9.73867	30	10.26133	9.94300	7	17
44	9.68190	23	9.73897	30	10.26103	9.94293	7	16
45	9.68213	24	9.73927	30	10.26073	9.94286	7	15
46	9.68237	23	9.73957	30	10.26043	9.94279	6	14
47	9.68260	23	9.73987	30	10.26013	9.94273	7	13
48	9.68283	22	9.74017	30	10.25983	9.94266	7	12
49	9.68305	23	9.74047	30	10.25953	9.94259	7	11
50	9.68328	23	9.74077	30	10.25923	9.94252	7	10
51	9.68351	23	9.74107	30	10.25893	9.94245	7	9
52	9.68374	23	9.74137	29	10.25863	9.94238	7	8
53	9.68397	23	9.74166	30	10.25834	9.94231	7	7
54	9.68420	23	9.74196	30	10.25804	9.94224	7	6
55	9.68443	23	9.74226	30	10.25774	9.94217	7	5
56	9.68466	23	9.74256	30	10.25744	9.94210	7	4
57	9.68489	23	9.74286	30	10.25714	9.94203	7	3
58	9.68512	22	9.74316	29	10.25684	9.94196	7	2
59	9.68534	23	9.74345	30	10.25655	9.94189	7	1
60	9.68557		9.74375		10.25625	9.94182		0
	Cos.		Cot.		Tang.	Sin.		

61 Degrees.

29 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cos.	D.	′
0	9.68557	23	9.74375	30	10.25625	9.94182	7	60
1	9.68580	23	9.74405	30	10.25595	9.94175	7	59
2	9.68603	23	9.74435	30	10.25565	9.94168	7	58
3	9.68625	22	9.74465	30	10.25535	9.94161	7	57
4	9.68648	23	9.74494	29	10.25506	9.94154	7	56
5	9.68671	23	9.74524	30	10.25476	9.94147	7	55
6	9.68694	23	9.74554	30	10.25446	9.94140	7	54
7	9.68716	22	9.74583	29	10.25417	9.94133	7	53
8	9.68739	23	9.74613	30	10.25387	9.94126	7	52
9	9.68762	23	9.74643	30	10.25357	9.94119	7	51
10	9.68784	22	9.74673	30	10.25327	9.94112	7	50
11	9.68807	23	9.74702	29	10.25298	9.94105	7	49
12	9.68829	22	9.74732	30	10.25268	9.94098	7	48
13	9.68852	23	9.74762	30	10.25238	9.94090	8	47
14	9.68875	23	9.74791	29	10.25209	9.94083	7	46
15	9.68897	22	9.74821	30	10.25179	9.94076	7	45
16	9.68920	23	9.74851	30	10.25149	9.94069	7	44
17	9.68942	22	9.74880	29	10.25120	9.94062	7	43
18	9.68965	23	9.74910	30	10.25090	9.94055	7	42
19	9.68987	22	9.74939	29	10.25061	9.94048	7	41
20	9.69010	23	9.74969	30	10.25031	9.94041	7	40
21	9.69032	22	9.74998	29	10.25002	9.94034	7	39
22	9.69055	23	9.75028	30	10.24972	9.94027	7	38
23	9.69077	22	9.75058	30	10.24942	9.94020	8	37
24	9.69100	23	9.75087	29	10.24913	9.94012	7	36
25	9.69122	22	9.75117	30	10.24883	9.94005	7	35
26	9.69144	22	9.75146	29	10.24854	9.93998	7	34
27	9.69167	23	9.75176	30	10.24824	9.93991	7	33
28	9.69189	22	9.75205	29	10.24795	9.93984	7	32
29	9.69212	23	9.75235	30	10.24765	9.93977	7	31
30	9.69234	22	9.75264	29	10.24736	9.93970	7	30
31	9.69256	23	9.75294	29	10.24706	9.93963	8	29
32	9.69279	22	9.75323	30	10.24677	9.93955	7	28
33	9.69301	22	9.75353	29	10.24647	9.93948	7	27
34	9.69323	22	9.75382	29	10.24618	9.93941	7	26
35	9.69345	23	9.75411	30	10.24589	9.93934	7	25
36	9.69368	22	9.75441	29	10.24559	9.93927	7	24
37	9.69390	22	9.75470	30	10.24530	9.93920	8	23
38	9.69412	22	9.75500	29	10.24500	9.93912	7	22
39	9.69434	22	9.75529	29	10.24471	9.93905	7	21
40	9.69456	23	9.75558	30	10.24442	9.93898	7	20
41	9.69479	22	9.75588	29	10.24412	9.93891	7	19
42	9.69501	22	9.75617	30	10.24383	9.93884	8	18
43	9.69523	22	9.75647	29	10.24353	9.93876	7	17
44	9.69545	22	9.75676	29	10.24324	9.93869	7	16
45	9.69567	22	9.75707	30	10.24295	9.93862	7	15
46	9.69589	22	9.75735	29	10.24265	9.93855	8	14
47	9.69611	22	9.75764	29	10.24236	9.93847	7	13
48	9.69633	22	9.75793	29	10.24207	9.93840	7	12
49	9.69655	22	9.75822	30	10.24178	9.93833	7	11
50	9.69677	22	9.75852	29	10.24148	9.93826	7	10
51	9.69699	22	9.75881	29	10.24119	9.93819	8	9
52	9.69721	22	9.75910	29	10.24090	9.93811	7	8
53	9.69743	22	9.75939	30	10.24061	9.93804	7	7
54	9.69765	22	9.75969	29	10.24031	9.93797	8	6
55	9.69787	22	9.75998	29	10.24002	9.93789	7	5
56	9.69809	22	9.76027	29	10.23973	9.93782	7	4
57	9.69831	22	9.76056	30	10.23944	9.93775	7	3
58	9.69853	22	9.76086	29	10.23914	9.93768	8	2
59	9.69875	22	9.76115	29	10.23885	9.93760	7	1
60	9.69897		9.76144		10.23856	9.93753		0
	Cos.		Cot.		Tang.	Sin.		

60 Degrees.

30 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.69897	22	9.76144	29	10.23856	9.93753	7	60
1	9.69919	22	9.76173	29	10.23827	9.93746	8	59
2	9.69941	22	9.76202	29	10.23798	9.93738	7	58
3	9.69963	21	9.76231	30	10.23769	9.93731	7	57
4	9.69984	22	9.76261	29	10.23739	9.93724	7	56
5	9.70006	22	9.76290	29	10.23710	9.93717	8	55
6	9.70028	22	9.76319	29	10.23681	9.93709	7	54
7	9.70050	22	9.76348	29	10.23652	9.93702	7	53
8	9.70072	21	9.76377	29	10.23623	9.93695	8	52
9	9.70093	22	9.76406	29	10.23594	9.93687	7	51
10	9.70115	22	9.76435	29	10.23565	9.93680	7	50
11	9.70137	22	9.76464	29	10.23536	9.93673	8	49
12	9.70159	21	9.76493	29	10.23507	9.93665	7	48
13	9.70180	22	9.76522	29	10.23478	9.93658	8	47
14	9.70202	22	9.76551	29	10.23449	9.93650	7	46
15	9.70224	21	9.76580	29	10.23420	9.93643	7	45
16	9.70245	22	9.76609	30	10.23391	9.93636	8	44
17	9.70267	21	9.76639	29	10.23361	9.93628	7	43
18	9.70288	22	9.76668	29	10.23332	9.93621	7	42
19	9.70310	22	9.76697	28	10.23303	9.93614	8	41
20	9.70332	21	9.76725	29	10.23275	9.93606	7	40
21	9.70353	22	9.76754	29	10.23246	9.93599	8	39
22	9.70375	21	9.76783	29	10.23217	9.93591	7	38
23	9.70396	22	9.76812	29	10.23188	9.93584	7	37
24	9.70418	21	9.76841	29	10.23159	9.93577	8	36
25	9.70439	22	9.76870	29	10.23130	9.93569	7	35
26	9.70461	21	9.76899	29	10.23101	9.93562	8	34
27	9.70482	22	9.76928	29	10.23072	9.93554	7	33
28	9.70504	21	9.76957	29	10.23043	9.93547	8	32
29	9.70525	22	9.76986	29	10.23014	9.93539	7	31
30	9.70547	21	9.77015	29	10.22985	9.93532	7	30
31	9.70568	22	9.77044	29	10.22956	9.93525	8	29
32	9.70590	21	9.77073	28	10.22927	9.93517	7	28
33	9.70611	22	9.77101	29	10.22899	9.93510	8	27
34	9.70633	21	9.77130	29	10.22870	9.93502	7	26
35	9.70654	21	9.77159	29	10.22841	9.93495	8	25
36	9.70675	22	9.77188	29	10.22812	9.93487	7	24
37	9.70697	21	9.77217	29	10.22783	9.93480	8	23
38	9.70718	21	9.77246	28	10.22754	9.93472	7	22
39	9.70739	22	9.77274	29	10.22726	9.93465	8	21
40	9.70761	21	9.77303	29	10.22697	9.93457	7	20
41	9.70782	21	9.77332	29	10.22668	9.93450	8	19
42	9.70803	21	9.77361	29	10.22639	9.93442	7	18
43	9.70824	22	9.77390	28	10.22610	9.93435	8	17
44	9.70846	21	9.77418	29	10.22582	9.93427	7	16
45	9.70867	21	9.77447	29	10.22553	9.93420	8	15
46	9.70888	21	9.77476	29	10.22524	9.93412	7	14
47	9.70909	22	9.77505	28	10.22495	9.93405	8	13
48	9.70931	21	9.77533	29	10.22467	9.93397	7	12
49	9.70952	21	9.77562	29	10.22438	9.93390	8	11
50	9.70973	21	9.77591	28	10.22409	9.93382	7	10
51	9.70994	21	9.77619	29	10.22381	9.93375	8	9
52	9.71015	21	9.77648	29	10.22352	9.93367	7	8
53	9.71036	21	9.77677	29	10.22323	9.93360	8	7
54	9.71058	22	9.77706	29	10.22294	9.93352	8	6
55	9.71079	21	9.77734	28	10.22266	9.93344	8	5
56	9.71100	21	9.77763	29	10.22237	9.93337	7	4
57	9.71121	21	9.77791	28	10.22209	9.93329	8	3
58	9.71142	21	9.77820	29	10.22180	9.93322	7	2
59	9.71163	21	9.77849	29	10.22151	9.93314	8	1
60	9.71184	21	9.77877	28	10.22123	9.93307	7	0
′	Cof.		Cot.		Tang.	Sin.		′

59 Degrees.

31 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.71184	21	9.77877	29	10.22123	9.93307	8	60
1	9.71205	21	9.77906	29	10.22094	9.93299	8	59
2	9.71226	21	9.77935	28	10.22065	9.93291	7	58
3	9.71247	21	9.77963	29	10.22037	9.93284	8	57
4	9.71268	21	9.77992	28	10.22008	9.93276	7	56
5	9.71289	21	9.78020	29	10.21980	9.93269	8	55
6	9.71310	21	9.78049	28	10.21951	9.93261	8	54
7	9.71331	21	9.78077	29	10.21923	9.93253	7	53
8	9.71352	21	9.78106	29	10.21894	9.93246	8	52
9	9.71373	20	9.78135	28	10.21865	9.93238	8	51
10	9.71393	21	9.78163	29	10.21837	9.93230	7	50
11	9.71414	21	9.78192	28	10.21808	9.93223	8	49
12	9.71435	21	9.78220	28	10.21780	9.93215	8	48
13	9.71456	21	9.78249	28	10.21751	9.93207	7	47
14	9.71477	21	9.78277	29	10.21723	9.93200	8	46
15	9.71498	21	9.78306	28	10.21694	9.93192	8	45
16	9.71519	20	9.78334	29	10.21666	9.93184	7	44
17	9.71539	21	9.78363	28	10.21637	9.93177	8	43
18	9.71560	21	9.78391	28	10.21609	9.93169	8	42
19	9.71581	21	9.78419	28	10.21581	9.93161	7	41
20	9.71602	20	9.78448	28	10.21552	9.93154	8	40
21	9.71622	21	9.78476	28	10.21524	9.93146	8	39
22	9.71643	21	9.78505	28	10.21495	9.93138	7	38
23	9.71664	21	9.78533	29	10.21467	9.93131	8	37
24	9.71685	20	9.78562	28	10.21438	9.93123	8	36
25	9.71705	21	9.78590	28	10.21410	9.93115	7	35
26	9.71726	21	9.78618	28	10.21382	9.93108	8	34
27	9.71747	20	9.78647	28	10.21353	9.93100	8	33
28	9.71767	21	9.78675	29	10.21325	9.93092	8	32
29	9.71788	21	9.78704	28	10.21296	9.93084	7	31
30	9.71809	20	9.78732	28	10.21268	9.93077	8	30
31	9.71829	21	9.78760	29	10.21240	9.93069	8	29
32	9.71850	20	9.78789	28	10.21211	9.93061	8	28
33	9.71870	21	9.78817	28	10.21183	9.93053	7	27
34	9.71891	20	9.78845	29	10.21155	9.93046	8	26
35	9.71911	21	9.78874	28	10.21126	9.93038	8	25
36	9.71932	20	9.78902	28	10.21098	9.93030	8	24
37	9.71952	21	9.78930	29	10.21070	9.93022	8	23
38	9.71973	21	9.78959	28	10.21041	9.93014	7	22
39	9.71994	20	9.78987	28	10.21013	9.93007	8	21
40	9.72014	20	9.79015	28	10.20985	9.92999	8	20
41	9.72034	21	9.79043	29	10.20957	9.92991	8	19
42	9.72055	20	9.79072	28	10.20928	9.92983	7	18
43	9.72075	20	9.79100	28	10.20900	9.92976	8	17
44	9.72096	20	9.79128	28	10.20872	9.92968	8	16
45	9.72116	21	9.79156	29	10.20844	9.92960	8	15
46	9.72137	20	9.79185	28	10.20815	9.92952	8	14
47	9.72157	20	9.79213	28	10.20787	9.92944	8	13
48	9.72177	21	9.79241	28	10.20759	9.92936	7	12
49	9.72198	20	9.79269	28	10.20731	9.92929	8	11
50	9.72218	20	9.79297	29	10.20703	9.92921	8	10
51	9.72238	21	9.79326	28	10.20674	9.92913	8	9
52	9.72259	20	9.79354	28	10.20646	9.92905	8	8
53	9.72279	20	9.79382	28	10.20618	9.92897	8	7
54	9.72299	21	9.79410	28	10.20590	9.92889	8	6
55	9.72320	20	9.79438	28	10.20562	9.92881	7	5
56	9.72340	20	9.79466	29	10.20534	9.92874	8	4
57	9.72360	21	9.79495	28	10.20505	9.92866	8	3
58	9.72381	20	9.79523	28	10.20477	9.92858	8	2
59	9.72401	20	9.79551	28	10.20449	9.92850	8	1
60	9.72421	20	9.79578	28	10.20421	9.92842	8	0
′	Cof.		Cot.		Tang.	Sin.		′

58 Degrees.

32 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.72421	20	9.79579	28	10.20421	9.92842	8	60
1	9.72441	20	9.79607	28	10.20393	9.92834	8	59
2	9.72461	21	9.79635	28	10.20365	9.92826	8	58
3	9.72482	20	9.79663	28	10.20337	9.92818	8	57
4	9.72502	20	9.79691	28	10.20309	9.92810	7	56
5	9.72522	20	9.79719	28	10.20281	9.92803	8	55
6	9.72542	20	9.79747	29	10.20253	9.92795	8	54
7	9.72562	20	9.79776	28	10.20224	9.92787	8	53
8	9.72582	20	9.79804	28	10.20196	9.92779	8	52
9	9.72602	20	9.79832	28	10.20168	9.92771	8	51
10	9.72622	21	9.79860	28	10.20140	9.92763	8	50
11	9.72643	20	9.79888	28	10.20112	9.92755	8	49
12	9.72663	20	9.79916	28	10.20084	9.92747	8	48
13	9.72683	20	9.79944	28	10.20056	9.92739	8	47
14	9.72703	20	9.79972	28	10.20028	9.92731	8	46
15	9.72723	20	9.80000	28	10.20000	9.92723	8	45
16	9.72743	20	9.80028	28	10.19972	9.92715	8	44
17	9.72763	20	9.80056	28	10.19944	9.92707	8	43
18	9.72783	20	9.80084	28	10.19916	9.92699	8	42
19	9.72803	20	9.80112	28	10.19888	9.92691	8	41
20	9.72823	20	9.80140	28	10.19860	9.92683	8	40
21	9.72843	20	9.80168	27	10.19832	9.92675	8	39
22	9.72863	20	9.80195	28	10.19805	9.92667	8	38
23	9.72883	19	9.80223	28	10.19777	9.92659	8	37
24	9.72902	20	9.80251	28	10.19749	9.92651	8	36
25	9.72922	20	9.80279	28	10.19721	9.92648	8	35
26	9.72942	20	9.80307	28	10.19693	9.92635	8	34
27	9.72962	20	9.80335	28	10.19665	9.92627	8	33
28	9.72982	20	9.80363	28	10.19637	9.92619	8	32
29	9.73002	20	9.80391	28	10.19609	9.92611	8	31
30	9.73022	19	9.80419	28	10.19581	9.92603	8	30
31	9.73041	20	9.80447	27	10.19553	9.92595	8	29
32	9.73061	20	9.80474	28	10.19526	9.92587	8	28
33	9.73081	20	9.80502	28	10.19498	9.92579	8	27
34	9.73101	20	9.80530	28	10.19470	9.92571	8	26
35	9.73121	19	9.80558	28	10.19442	9.92563	8	25
36	9.73140	20	9.80586	28	10.19414	9.92555	9	24
37	9.73160	20	9.80614	28	10.19386	9.92546	8	23
38	9.73180	20	9.80642	27	10.19358	9.92538	8	22
39	9.73200	19	9.80669	28	10.19331	9.92530	8	21
40	9.73219	20	9.80697	28	10.19303	9.92522	8	20
41	9.73239	20	9.80725	28	10.19275	9.92514	8	19
42	9.73259	19	9.80753	28	10.19247	9.92506	8	18
43	9.73278	20	9.80781	27	10.19219	9.92498	8	17
44	9.73298	20	9.80808	28	10.19192	9.92490	8	16
45	9.73318	19	9.80836	28	10.19164	9.92482	9	15
46	9.73337	20	9.80864	28	10.19136	9.92473	8	14
47	9.73357	20	9.80892	27	10.19108	9.92465	8	13
48	9.73377	19	9.80919	28	10.19081	9.92457	8	12
49	9.73396	20	9.80947	28	10.19053	9.92449	8	11
50	9.73416	19	9.80975	28	10.19025	9.92441	8	10
51	9.73435	20	9.81003	27	10.18997	9.92433	8	9
52	9.73455	19	9.81030	28	10.18970	9.92425	9	8
53	9.73474	20	9.81058	28	10.18942	9.92416	8	7
54	9.73494	19	9.81086	27	10.18914	9.92408	8	6
55	9.73513	20	9.81113	28	10.18887	9.92400	8	5
56	9.73533	19	9.81141	28	10.18859	9.92392	8	4
57	9.73552	20	9.81169	27	10.18831	9.92384	8	3
58	9.73572	19	9.81196	28	10.18804	9.92376	9	2
59	9.73591	20	9.81224	28	10.18776	9.92367	8	1
60	9.73611		9.81252		10.18748	9.92359		0
	Cof.		Cot.		Tang.	Sin.		

57 Degrees.

33 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.73611	19	9.81252	27	10.18748	9.92359	8	60
1	9.73630	20	9.81279	28	10.18721	9.92351	8	59
2	9.73650	19	9.81307	28	10.18693	9.92343	8	58
3	9.73669	20	9.81335	27	10.18665	9.92335	9	57
4	9.73689	19	9.81362	28	10.18638	9.92326	8	56
5	9.73708	19	9.81390	28	10.18610	9.92318	8	55
6	9.73727	20	9.81418	27	10.18582	9.92310	8	54
7	9.73747	19	9.81445	28	10.18555	9.92302	9	53
8	9.73766	19	9.81473	27	10.18527	9.92293	8	52
9	9.73785	19	9.81500	28	10.18500	9.92285	8	51
10	9.73805	20	9.81528	28	10.18472	9.92277	8	50
11	9.73824	19	9.81556	28	10.18444	9.92269	9	49
12	9.73843	19	9.81583	27	10.18417	9.92260	8	48
13	9.73863	20	9.81611	28	10.18389	9.92252	8	47
14	9.73882	19	9.81638	27	10.18362	9.92244	9	46
15	9.73901	19	9.81666	28	10.18334	9.92235	8	45
16	9.73921	20	9.81693	27	10.18307	9.92227	8	44
17	9.73940	19	9.81721	28	10.18279	9.92219	8	43
18	9.73959	19	9.81748	27	10.18252	9.92211	9	42
19	9.73978	19	9.81776	28	10.18224	9.92202	8	41
20	9.73997	19	9.81803	27	10.18197	9.92194	8	40
21	9.74017	20	9.81831	28	10.18169	9.92186	9	39
22	9.74036	19	9.81858	27	10.18142	9.92177	8	38
23	9.74055	19	9.81886	28	10.18114	9.92169	8	37
24	9.74074	19	9.81913	27	10.18087	9.92161	9	36
25	9.74093	19	9.81941	28	10.18059	9.92152	8	35
26	9.74113	20	9.81968	27	10.18032	9.92144	8	34
27	9.74132	19	9.81996	28	10.18004	9.92136	9	33
28	9.74151	19	9.82023	27	10.17977	9.92127	8	32
29	9.74170	19	9.82051	28	10.17949	9.92119	8	31
30	9.74189	19	9.82078	27	10.17922	9.92111	9	30
31	9.74208	19	9.82106	28	10.17894	9.92102	8	29
32	9.74227	19	9.82133	27	10.17867	9.92094	8	28
33	9.74246	19	9.82161	28	10.17839	9.92086	9	27
34	9.74265	19	9.82188	27	10.17812	9.92077	8	26
35	9.74284	19	9.82215	27	10.17785	9.92069	8	25
36	9.74303	19	9.82243	28	10.17757	9.92060	9	24
37	9.74322	19	9.82270	27	10.17730	9.92052	8	23
38	9.74341	19	9.82298	27	10.17702	9.92044	8	22
39	9.74360	19	9.82325	27	10.17675	9.92035	9	21
40	9.74379	19	9.82352	28	10.17648	9.92027	8	20
41	9.74398	19	9.82380	27	10.17620	9.92018	8	19
42	9.74417	19	9.82407	28	10.17593	9.92010	8	18
43	9.74436	19	9.82435	27	10.17565	9.92002	9	17
44	9.74455	19	9.82462	27	10.17538	9.91993	8	16
45	9.74474	19	9.82489	28	10.17511	9.91985	9	15
46	9.74493	19	9.82517	27	10.17483	9.91976	8	14
47	9.74512	19	9.82544	27	10.17456	9.91968	9	13
48	9.74531	18	9.82571	28	10.17429	9.91959	8	12
49	9.74549	19	9.82599	27	10.17401	9.91951	9	11
50	9.74568	19	9.82626	27	10.17374	9.91942	8	10
51	9.74587	19	9.82653	28	10.17347	9.91934	9	9
52	9.74606	19	9.82681	27	10.17319	9.91925	8	8
53	9.74625	19	9.82708	27	10.17292	9.91917	9	7
54	9.74644	18	9.82735	27	10.17265	9.91908	8	6
55	9.74662	19	9.82762	28	10.17238	9.91900	9	5
56	9.74681	19	9.82790	27	10.17210	9.91891	8	4
57	9.74700	19	9.82817	27	10.17183	9.91883	9	3
58	9.74719	18	9.82844	27	10.17156	9.91874	8	2
59	9.74737	19	9.82871	28	10.17129	9.91866	9	1
60	9.74756		9.82899		10.17101	9.91857		0
	Cof.		Cot.		Tang.	Sin.		

56 Degrees.

34 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.74756	19	9.82899	27	10.17101	9.91857	8	60
1	9.74775	19	9.82926	27	10.17074	9.91849	9	59
2	9.74794	18	9.82953	27	10.17047	9.91840	8	58
3	9.74812	19	9.82980	28	10.17020	9.91832	9	57
4	9.74831	19	9.83008	27	10.16992	9.91823	8	56
5	9.74850	18	9.83035	27	10.16965	9.91815	9	55
6	9.74868	19	9.83062	27	10.16938	9.91806	8	54
7	9.74887	19	9.83089	28	10.16911	9.91798	9	53
8	9.74906	18	9.83117	27	10.16883	9.91789	8	52
9	9.74924	19	9.83144	27	10.16856	9.91781	9	51
10	9.74943	18	9.83171	27	10.16829	9.91772	9	50
11	9.74961	19	9.83198	27	10.16802	9.91763	8	49
12	9.74980	19	9.83225	27	10.16775	9.91755	9	48
13	9.74999	18	9.83252	28	10.16748	9.91746	8	47
14	9.75017	19	9.83280	27	10.16720	9.91738	9	46
15	9.75036	18	9.83307	27	10.16693	9.91729	9	45
16	9.75054	19	9.83334	27	10.16666	9.91720	8	44
17	9.75073	18	9.83361	27	10.16639	9.91712	9	43
18	9.75091	19	9.83388	27	10.16612	9.91703	8	42
19	9.75110	18	9.83415	27	10.16585	9.91695	9	41
20	9.75128	19	9.83442	28	10.16558	9.91686	9	40
21	9.75147	18	9.83470	27	10.16530	9.91677	8	39
22	9.75165	19	9.83497	27	10.16503	9.91669	9	38
23	9.75184	18	9.83524	27	10.16476	9.91660	9	37
24	9.75202	19	9.83551	27	10.16449	9.91651	8	36
25	9.75221	18	9.83578	27	10.16422	9.91643	9	35
26	9.75239	19	9.83605	27	10.16395	9.91634	9	34
27	9.75258	18	9.83632	27	10.16368	9.91625	8	33
28	9.75276	18	9.83659	27	10.16341	9.91617	9	32
29	9.75294	19	9.83686	27	10.16314	9.91608	9	31
30	9.75313	18	9.83713	27	10.16287	9.91599	8	30
31	9.75331	19	9.83740	28	10.16260	9.91591	9	29
32	9.75350	18	9.83768	27	10.16232	9.91582	9	28
33	9.75368	18	9.83795	27	10.16205	9.91573	8	27
34	9.75386	19	9.83822	27	10.16178	9.91565	9	26
35	9.75405	18	9.83849	27	10.16151	9.91556	9	25
36	9.75423	18	9.83876	27	10.16124	9.91547	9	24
37	9.75441	18	9.83903	27	10.16097	9.91538	8	23
38	9.75459	19	9.83930	27	10.16070	9.91530	9	22
39	9.75478	18	9.83957	27	10.16043	9.91521	9	21
40	9.75496	18	9.83984	27	10.16016	9.91512	8	20
41	9.75514	19	9.84011	27	10.15989	9.91504	9	19
42	9.75533	18	9.84038	27	10.15962	9.91495	9	18
43	9.75551	18	9.84065	27	10.15935	9.91486	9	17
44	9.75569	18	9.84092	27	10.15908	9.91477	8	16
45	9.75587	18	9.84119	27	10.15881	9.91469	9	15
46	9.75605	19	9.84146	27	10.15854	9.91460	9	14
47	9.75624	18	9.84173	27	10.15827	9.91451	9	13
48	9.75642	18	9.84200	27	10.15800	9.91442	9	12
49	9.75660	18	9.84227	27	10.15773	9.91433	8	11
50	9.75678	18	9.84254	26	10.15746	9.91425	9	10
51	9.75696	18	9.84280	27	10.15720	9.91416	9	9
52	9.75714	19	9.84307	27	10.15693	9.91407	9	8
53	9.75733	18	9.84334	27	10.15666	9.91398	9	7
54	9.75751	18	9.84361	27	10.15639	9.91389	8	6
55	9.75769	18	9.84388	27	10.15612	9.91381	9	5
56	9.75787	18	9.84415	27	10.15585	9.91372	9	4
57	9.75805	18	9.84442	27	10.15558	9.91363	9	3
58	9.75823	18	9.84469	27	10.15531	9.91354	9	2
59	9.75841	18	9.84496	27	10.15504	9.91345	9	1
60	9.75859		9.84523		10.15477	9.91336		0
	Cof.		Cot.		Tang.	Sin.		

55 Degrees.

35 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Col.	D.	′
0	9.75859	18	9.84523	27	10.15477	9.91336	8	60
1	9.75877	18	9.84550	26	10.15450	9.91328	9	59
2	9.75895	18	9.84576	27	10.15424	9.91319	9	58
3	9.75913	18	9.84603	27	10.15397	9.91310	9	57
4	9.75931	18	9.84630	27	10.15370	9.91301	9	56
5	9.75949	18	9.84657	27	10.15343	9.91292	9	55
6	9.75967	18	9.84684	27	10.15316	9.91283	9	54
7	9.75985	18	9.84711	27	10.15289	9.91274	8	53
8	9.76003	18	9.84738	26	10.15262	9.91266	9	52
9	9.76021	18	9.84764	27	10.15236	9.91257	9	51
10	9.76039	18	9.84791	27	10.15209	9.91248	9	50
11	9.76057	18	9.84818	27	10.15182	9.91239	9	49
12	9.76075	18	9.84845	27	10.15155	9.91230	9	48
13	9.76093	18	9.84872	27	10.15128	9.91221	9	47
14	9.76111	18	9.84899	26	10.15101	9.91212	9	46
15	9.76129	17	9.84925	27	10.15075	9.91203	9	45
16	9.76146	18	9.84952	27	10.15048	9.91194	9	44
17	9.76164	18	9.84979	27	10.15021	9.91185	9	43
18	9.76182	18	9.85006	27	10.14994	9.91176	9	42
19	9.76200	18	9.85033	26	10.14967	9.91167	9	41
20	9.76218	18	9.85059	27	10.14941	9.91158	9	40
21	9.76236	17	9.85086	27	10.14914	9.91149	8	39
22	9.76253	18	9.85113	27	10.14887	9.91141	9	38
23	9.76271	18	9.85140	27	10.14860	9.91132	9	37
24	9.76289	18	9.85166	26	10.14834	9.91123	9	36
25	9.76307	17	9.85193	27	10.14807	9.91114	9	35
26	9.76324	18	9.85220	27	10.14780	9.91105	9	34
27	9.76342	18	9.85247	26	10.14753	9.91096	9	33
28	9.76360	18	9.85273	27	10.14727	9.91087	9	32
29	9.76378	17	9.85300	27	10.14700	9.91078	9	31
30	9.76395	18	9.85327	27	10.14673	9.91069	9	30
31	9.76413	18	9.85354	26	10.14646	9.91060	9	29
32	9.76431	18	9.85380	27	10.14620	9.91051	9	28
33	9.76448	17	9.85407	27	10.14593	9.91042	9	27
34	9.76466	18	9.85434	26	10.14566	9.91033	10	26
35	9.76484	17	9.85460	27	10.14540	9.91023	9	25
36	9.76501	18	9.85487	27	10.14513	9.91014	9	24
37	9.76519	18	9.85514	26	10.14486	9.91005	9	23
38	9.76537	18	9.85540	27	10.14460	9.90996	9	22
39	9.76554	17	9.85567	27	10.14433	9.90987	9	21
40	9.76572	18	9.85594	26	10.14406	9.90978	9	20
41	9.76590	17	9.85620	27	10.14380	9.90969	9	19
42	9.76607	18	9.85647	27	10.14353	9.90960	9	18
43	9.76625	17	9.85674	26	10.14326	9.90951	9	17
44	9.76642	18	9.85700	27	10.14300	9.90942	9	16
45	9.76660	17	9.85727	27	10.14273	9.90933	9	15
46	9.76677	18	9.85754	26	10.14246	9.90924	9	14
47	9.76695	18	9.85780	27	10.14220	9.90915	9	13
48	9.76712	17	9.85807	27	10.14193	9.90906	10	12
49	9.76730	18	9.85834	26	10.14166	9.90896	9	11
50	9.76747	17	9.85860	27	10.14140	9.90887	9	10
51	9.76765	17	9.85887	26	10.14113	9.90878	9	9
52	9.76782	18	9.85913	27	10.14087	9.90869	9	8
53	9.76800	17	9.85940	27	10.14060	9.90860	9	7
54	9.76817	18	9.85967	26	10.14033	9.90851	9	6
55	9.76835	17	9.85993	27	10.14007	9.90842	10	5
56	9.76852	18	9.86020	26	10.13980	9.90832	9	4
57	9.76870	17	9.86046	27	10.13954	9.90823	9	3
58	9.76887	17	9.86073	27	10.13927	9.90814	9	2
59	9.76904	18	9.86100	26	10.13900	9.90805	9	1
60	9.76922		9.86126		10.13874	9.90796		0
	Cof.		Cot.		Tang.	Sin.		

54 Degrees.

36 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.76922	17	9.86126	27	10.13874	9.90796	9	60
1	9.76939	18	9.86153	26	10.13847	9.90787	10	59
2	9.76957	17	9.86179	27	10.13821	9.90777	9	58
3	9.76974	17	9.86206	26	10.13794	9.90768	9	57
4	9.76991	18	9.86232	27	10.13768	9.90759	9	56
5	9.77009	17	9.86259	26	10.13741	9.90750	9	55
6	9.77026	17	9.86285	27	10.13715	9.90741	10	54
7	9.77043	18	9.86312	26	10.13688	9.90731	9	53
8	9.77061	17	9.86338	27	10.13662	9.90722	9	52
9	9.77078	17	9.86365	27	10.13635	9.90713	9	51
10	9.77095	17	9.86392	26	10.13608	9.90704	10	50
11	9.77112	18	9.86418	27	10.13582	9.90694	9	49
12	9.77130	17	9.86445	26	10.13555	9.90685	9	48
13	9.77147	17	9.86471	27	10.13529	9.90676	9	47
14	9.77164	17	9.86498	26	10.13502	9.90667	10	46
15	9.77181	18	9.86524	27	10.13476	9.90657	9	45
16	9.77199	17	9.86551	26	10.13449	9.90648	9	44
17	9.77216	17	9.86577	26	10.13423	9.90639	9	43
18	9.77233	17	9.86603	27	10.13397	9.90630	10	42
19	9.77250	18	9.86630	26	10.13370	9.90620	9	41
20	9.77268	17	9.86656	27	10.13344	9.90611	9	40
21	9.77285	17	9.86683	26	10.13317	9.90602	10	39
22	9.77302	17	9.86709	27	10.13291	9.90592	9	38
23	9.77319	17	9.86736	26	10.13264	9.90583	9	37
24	9.77336	17	9.86762	27	10.13238	9.90574	9	36
25	9.77353	17	9.86789	26	10.13211	9.90565	10	35
26	9.77370	17	9.86815	27	10.13185	9.90555	9	34
27	9.77387	18	9.86842	26	10.13158	9.90546	9	33
28	9.77405	17	9.86868	26	10.13132	9.90537	10	32
29	9.77422	17	9.86894	27	10.13106	9.90527	9	31
30	9.77439	17	9.86921	26	10.13079	9.90518	9	30
31	9.77456	17	9.86947	27	10.13053	9.90509	10	29
32	9.77473	17	9.86974	26	10.13026	9.90499	9	28
33	9.77490	17	9.87000	27	10.13000	9.90490	10	27
34	9.77507	17	9.87027	26	10.12973	9.90480	9	26
35	9.77524	17	9.87053	26	10.12947	9.90471	9	25
36	9.77541	17	9.87079	27	10.12921	9.90462	10	24
37	9.77558	17	9.87106	26	10.12894	9.90452	9	23
38	9.77575	17	9.87132	26	10.12868	9.90443	9	22
39	9.77592	17	9.87158	27	10.12842	9.90434	9	21
40	9.77609	17	9.87185	26	10.12815	9.90424	10	20
41	9.77626	17	9.87211	27	10.12789	9.90415	9	19
42	9.77643	17	9.87238	26	10.12762	9.90405	10	18
43	9.77660	17	9.87264	26	10.12736	9.90396	9	17
44	9.77677	17	9.87290	27	10.12710	9.90386	10	16
45	9.77694	17	9.87317	26	10.12683	9.90377	9	15
46	9.77711	17	9.87343	26	10.12657	9.90368	10	14
47	9.77728	16	9.87369	27	10.12631	9.90358	9	13
48	9.77744	17	9.87396	26	10.12604	9.90349	10	12
49	9.77761	17	9.87422	26	10.12578	9.90339	9	11
50	9.77778	17	9.87448	27	10.12552	9.90330	10	10
51	9.77795	17	9.87475	26	10.12525	9.90320	9	9
52	9.77812	17	9.87501	26	10.12499	9.90311	10	8
53	9.77829	17	9.87527	27	10.12473	9.90301	9	7
54	9.77846	16	9.87554	26	10.12446	9.90292	10	6
55	9.77862	17	9.87580	26	10.12420	9.90282	9	5
56	9.77879	17	9.87606	27	10.12394	9.90273	10	4
57	9.77896	17	9.87633	26	10.12367	9.90263	9	3
58	9.77913	17	9.87659	26	10.12341	9.90254	10	2
59	9.77930	16	9.87685	26	10.12315	9.90244	9	1
60	9.77946		9.87711		10.12289	9.90235		0
	Cof.		Cot.		Tang.	Sin.		

53 Degrees.

37 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.77946	17	9.87711	27	10.12289	9.90235	10	60
1	9.77963	17	9.87738	26	10.12262	9.90225	9	59
2	9.77980	17	9.87764	26	10.12236	9.90216	10	58
3	9.77997	16	9.87790	27	10.12210	9.90206	9	57
4	9.78013	17	9.87817	26	10.12183	9.90197	10	56
5	9.78030	17	9.87843	26	10.12157	9.90187	9	55
6	9.78047	16	9.87869	26	10.12131	9.90178	10	54
7	9.78063	17	9.87895	27	10.12105	9.90168	9	53
8	9.78080	17	9.87922	26	10.12078	9.90159	10	52
9	9.78097	16	9.87948	26	10.12052	9.90149	10	51
10	9.78113	17	9.87974	26	10.12026	9.90139	9	50
11	9.78130	17	9.88000	27	10.12000	9.90130	10	49
12	9.78147	16	9.88027	26	10.11973	9.90120	9	48
13	9.78163	17	9.88053	26	10.11947	9.90111	10	47
14	9.78180	17	9.88079	26	10.11921	9.90101	10	46
15	9.78197	16	9.88105	26	10.11895	9.90091	9	45
16	9.78213	17	9.88131	27	10.11869	9.90082	10	44
17	9.78230	17	9.88158	26	10.11842	9.90072	9	43
18	9.78246	16	9.88184	26	10.11816	9.90063	10	42
19	9.78263	17	9.88210	26	10.11790	9.90053	10	41
20	9.78280	17	9.88236	26	10.11764	9.90043	9	40
21	9.78296	17	9.88262	27	10.11738	9.90034	10	39
22	9.78313	16	9.88289	26	10.11711	9.90024	10	38
23	9.78329	17	9.88315	26	10.11685	9.90014	9	37
24	9.78346	16	9.88341	26	10.11659	9.90005	10	36
25	9.78362	17	9.88367	26	10.11633	9.89995	10	35
26	9.78379	16	9.88393	27	10.11607	9.89985	9	34
27	9.78395	17	9.88420	26	10.11580	9.89976	10	33
28	9.78412	16	9.88446	26	10.11554	9.89966	10	32
29	9.78428	17	9.88472	26	10.11528	9.89956	9	31
30	9.78445	16	9.88498	26	10.11502	9.89947	10	30
31	9.78461	17	9.88524	26	10.11476	9.89937	10	29
32	9.78478	17	9.88550	27	10.11450	9.89927	9	28
33	9.78494	16	9.88577	26	10.11423	9.89918	10	27
34	9.78510	17	9.88603	26	10.11397	9.89908	10	26
35	9.78527	16	9.88629	26	10.11371	9.89898	10	25
36	9.78543	17	9.88655	26	10.11345	9.89888	9	24
37	9.78560	16	9.88681	26	10.11319	9.89879	10	23
38	9.78576	16	9.88707	26	10.11293	9.89869	10	22
39	9.78592	17	9.88733	26	10.11267	9.89859	10	21
40	9.78609	16	9.88759	27	10.11241	9.89849	9	20
41	9.78625	17	9.88786	26	10.11214	9.89840	10	19
42	9.78642	16	9.88812	26	10.11188	9.89830	10	18
43	9.78658	16	9.88838	26	10.11162	9.89820	10	17
44	9.78674	17	9.88864	26	10.11136	9.89810	9	16
45	9.78691	16	9.88890	26	10.11110	9.89801	10	15
46	9.78707	16	9.88916	26	10.11084	9.89791	10	14
47	9.78723	16	9.88942	26	10.11058	9.89781	10	13
48	9.78739	17	9.88968	26	10.11032	9.89771	10	12
49	9.78756	16	9.88994	26	10.11006	9.89761	9	11
50	9.78772	16	9.89020	26	10.10980	9.89752	10	10
51	9.78788	17	9.89046	27	10.10954	9.89742	10	9
52	9.78805	16	9.89073	26	10.10927	9.89732	10	8
53	9.78821	16	9.89099	26	10.10901	9.89722	10	7
54	9.78837	16	9.89125	26	10.10875	9.89712	10	6
55	9.78853	16	9.89151	26	10.10849	9.89702	9	5
56	9.78869	17	9.89177	26	10.10823	9.89693	10	4
57	9.78886	16	9.89203	26	10.10797	9.89683	10	3
58	9.78902	16	9.89229	26	10.10771	9.89673	10	2
59	9.78918	16	9.89255	26	10.10745	9.89663	10	1
60	9.78934		9.89281		10.10719	9.89653		0
	Cof.		Cot.		Tang.	Sin.		

52 Degrees.

38 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.78934	16	9.89281	26	10.10719	9.89653	10	60
1	9.78950	17	9.89307	26	10.10693	9.89643	10	59
2	9.78967	16	9.89333	26	10.10667	9.89633	9	58
3	9.78983	16	9.89359	26	10.10641	9.89624	10	57
4	9.78999	16	9.89385	26	10.10615	9.89614	10	56
5	9.79015	16	9.89411	26	10.10589	9.89604	10	55
6	9.79031	16	9.89437	26	10.10563	9.89594	10	54
7	9.79047	16	9.89463	26	10.10537	9.89584	10	53
8	9.79063	16	9.89489	26	10.10511	9.89574	10	52
9	9.79079	16	9.89515	26	10.10485	9.89564	10	51
10	9.79095	16	9.89541	26	10.10459	9.89554	10	50
11	9.79111	17	9.89567	26	10.10433	9.89544	10	49
12	9.79128	16	9.89593	26	10.10407	9.89534	10	48
13	9.79144	16	9.89619	26	10.10381	9.89524	10	47
14	9.79160	16	9.89645	26	10.10355	9.89514	10	46
15	9.79176	16	9.89671	26	10.10329	9.89504	9	45
16	9.79192	16	9.89697	26	10.10303	9.89495	10	44
17	9.79208	16	9.89723	26	10.10277	9.89485	10	43
18	9.79224	16	9.89749	26	10.10251	9.89475	10	42
19	9.79240	16	9.89775	26	10.10225	9.89465	10	41
20	9.79256	16	9.89801	26	10.10199	9.89455	10	40
21	9.79272	16	9.89827	26	10.10173	9.89445	10	39
22	9.79288	16	9.89853	26	10.10147	9.89435	10	38
23	9.79304	15	9.89879	26	10.10121	9.89425	10	37
24	9.79319	16	9.89905	26	10.10095	9.89415	10	36
25	9.79335	16	9.89931	26	10.10069	9.89405	10	35
26	9.79351	16	9.89957	26	10.10043	9.89395	10	34
27	9.79367	16	9.89983	26	10.10017	9.89385	10	33
28	9.79383	16	9.90009	26	10.09991	9.89375	11	32
29	9.79399	16	9.90035	26	10.09965	9.89364	10	31
30	9.79415	16	9.90061	25	10.09939	9.89354	10	30
31	9.79431	16	9.90086	26	10.09914	9.89344	10	29
32	9.79447	16	9.90112	26	10.09888	9.89334	10	28
33	9.79463	15	9.90138	26	10.09862	9.89324	10	27
34	9.79478	16	9.90164	26	10.09836	9.89314	10	26
35	9.79494	16	9.90190	26	10.09810	9.89304	10	25
36	9.79510	16	9.90216	26	10.09784	9.89294	10	24
37	9.79526	16	9.90242	26	10.09758	9.89284	10	23
38	9.79542	16	9.90268	26	10.09732	9.89274	10	22
39	9.79558	15	9.90294	26	10.09706	9.89264	10	21
40	9.79573	16	9.90320	26	10.09680	9.89254	10	20
41	9.79589	16	9.90346	25	10.09654	9.89244	11	19
42	9.79605	16	9.90371	26	10.09629	9.89233	10	18
43	9.79621	15	9.90397	26	10.09603	9.89223	10	17
44	9.79636	16	9.90423	26	10.09577	9.89213	10	16
45	9.79652	16	9.90449	26	10.09551	9.89203	10	15
46	9.79668	16	9.90475	26	10.09525	9.89193	10	14
47	9.79684	15	9.90501	26	10.09499	9.89183	10	13
48	9.79699	16	9.90527	26	10.09473	9.89173	11	12
49	9.79715	16	9.90553	25	10.09447	9.89162	10	11
50	9.79731	15	9.90578	26	10.09422	9.89152	10	10
51	9.79746	16	9.90604	26	10.09396	9.89142	10	9
52	9.79762	16	9.90630	26	10.09370	9.89132	10	8
53	9.79778	15	9.90656	26	10.09344	9.89122	10	7
54	9.79793	16	9.90682	26	10.09318	9.89112	11	6
55	9.79809	16	9.90708	26	10.09292	9.89101	10	5
56	9.79825	15	9.90734	25	10.09266	9.89091	10	4
57	9.79840	16	9.90759	26	10.09241	9.89081	10	3
58	9.79856	16	9.90785	26	10.09215	9.89071	11	2
59	9.79872	15	9.90811	26	10.09189	9.89060	10	1
60	9.79887		9.90837		10.09163	9.89050		0
	Cof.		Cot.		Tang.	Sin.		

51 Degrees.

39 Degrees.

′	Sin	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.79887	16	9.90837	26	10.09163	9.89050	10	60
1	9.79903	15	9.90863	26	10.09137	9.89040	10	59
2	9.79918	16	9.90889	25	10.09111	9.89030	10	58
3	9.79934	16	9.90914	26	10.09086	9.89020	11	57
4	9.79950	15	9.90940	26	10.09060	9.89009	10	56
5	9.79965	16	9.90966	26	10.09034	9.88999	10	55
6	9.79981	15	9.90992	26	10.09008	9.88989	11	54
7	9.79996	16	9.91018	25	10.08982	9.88978	10	53
8	9.80012	15	9.91043	26	10.08957	9.88968	10	52
9	9.80027	16	9.91069	26	10.08931	9.88958	10	51
10	9.80043	15	9.91095	26	10.08905	9.88948	11	50
11	9.80058	16	9.91121	26	10.08879	9.88937	10	49
12	9.80074	15	9.91147	25	10.08853	9.88927	10	48
13	9.80089	16	9.91172	26	10.08828	9.88917	11	47
14	9.80105	15	9.91198	26	10.08802	9.88906	10	46
15	9.80120	16	9.91224	26	10.08776	9.88896	10	45
16	9.80136	15	9.91250	26	10.08750	9.88886	11	44
17	9.80151	15	9.91276	25	10.08724	9.88875	10	43
18	9.80166	16	9.91301	26	10.08699	9.88865	10	42
19	9.80182	15	9.91327	26	10.08673	9.88855	11	41
20	9.80197	16	9.91353	26	10.08647	9.88844	10	40
21	9.80213	15	9.91379	25	10.08621	9.88834	10	39
22	9.80228	16	9.91404	26	10.08596	9.88824	11	38
23	9.80244	15	9.91430	26	10.08570	9.88813	10	37
24	9.80259	15	9.91456	26	10.08544	9.88803	10	36
25	9.80274	16	9.91482	25	10.08518	9.88793	11	35
26	9.80290	15	9.91507	26	10.08493	9.88782	10	34
27	9.80305	15	9.91533	26	10.08467	9.88772	11	33
28	9.80320	16	9.91559	26	10.08441	9.88761	10	32
29	9.80336	15	9.91585	25	10.08415	9.88751	10	31
30	9.80351	15	9.91610	26	10.08390	9.88741	11	30
31	9.80366	16	9.91636	26	10.08364	9.88730	10	29
32	9.80382	15	9.91662	26	10.08338	9.88720	11	28
33	9.80397	15	9.91688	25	10.08312	9.88709	10	27
34	9.80412	16	9.91713	26	10.08287	9.88699	11	26
35	9.80428	15	9.91739	26	10.08261	9.88688	10	25
36	9.80443	15	9.91765	26	10.08235	9.88678	10	24
37	9.80458	15	9.91791	25	10.08209	9.88667	11	23
38	9.80473	16	9.91816	26	10.08184	9.88657	10	22
39	9.80489	15	9.91842	26	10.08158	9.88647	11	21
40	9.80504	15	9.91868	25	10.08132	9.88636	10	20
41	9.80519	15	9.91893	26	10.08107	9.88626	11	19
42	9.80534	16	9.91919	26	10.08081	9.88615	10	18
43	9.80550	15	9.91945	26	10.08055	9.88605	11	17
44	9.80565	15	9.91971	25	10.08029	9.88594	10	16
45	9.80580	15	9.91996	26	10.08004	9.88584	11	15
46	9.80595	15	9.92022	26	10.07978	9.88573	10	14
47	9.80610	15	9.92048	25	10.07952	9.88563	11	13
48	9.80625	16	9.92073	26	10.07927	9.88552	10	12
49	9.80641	15	9.92099	26	10.07901	9.88542	11	11
50	9.80656	15	9.92125	25	10.07875	9.88531	10	10
51	9.80671	15	9.92150	26	10.07850	9.88521	11	9
52	9.80686	15	9.92176	26	10.07824	9.88510	11	8
53	9.80701	15	9.92202	26	10.07798	9.88499	10	7
54	9.80716	15	9.92227	25	10.07773	9.88489	11	6
55	9.80731	15	9.92253	26	10.07747	9.88478	10	5
56	9.80746	16	9.92279	25	10.07721	9.88468	11	4
57	9.80762	15	9.92304	26	10.07696	9.88457	10	3
58	9.80777	15	9.92330	26	10.07670	9.88447	11	2
59	9.80792	15	9.92356	25	10.07644	9.88436	11	1
60	9.80807		9.92381		10.07619	9.88425		0
	Cof.		Cot.		Tang.	Sin.		

50 Degrees.

40 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cos.	D.	′
0	9.80807	15	9.92381	26	10.07619	9.88425	10	60
1	9.80822	15	9.92407	26	10.07593	9.88415	11	59
2	9.80837	15	9.92433	25	10.07567	9.88404	10	58
3	9.80852	15	9.92458	26	10.07542	9.88394	11	57
4	9.80867	15	9.92484	26	10.07516	9.88383	11	56
5	9.80882	15	9.92510	25	10.07490	9.88372	10	55
6	9.80897	15	9.92535	26	10.07465	9.88362	11	54
7	9.80912	15	9.92561	26	10.07439	9.88351	11	53
8	9.80927	15	9.92587	25	10.07413	9.88340	10	52
9	9.80942	15	9.92612	26	10.07388	9.88330	11	51
10	9.80957	15	9.92638	25	10.07362	9.88319	11	50
11	9.80972	15	9.92663	26	10.07337	9.88308	10	49
12	9.80987	15	9.92689	26	10.07311	9.88298	11	48
13	9.81002	15	9.92715	25	10.07285	9.88287	11	47
14	9.81017	15	9.92740	26	10.07260	9.88276	10	46
15	9.81032	15	9.92766	26	10.07234	9.88266	11	45
16	9.81047	14	9.92792	25	10.07208	9.88255	11	44
17	9.81061	15	9.92817	26	10.07183	9.88244	10	43
18	9.81076	15	9.92843	25	10.07157	9.88234	11	42
19	9.81091	15	9.92868	26	10.07132	9.88223	11	41
20	9.81106	15	9.92894	26	10.07106	9.88212	11	40
21	9.81121	15	9.92920	25	10.07080	9.88201	10	39
22	9.81136	15	9.92945	26	10.07055	9.88191	11	38
23	9.81151	15	9.92971	25	10.07029	9.88180	11	37
24	9.81166	14	9.92996	26	10.07004	9.88169	11	36
25	9.81180	15	9.93022	26	10.06978	9.88158	10	35
26	9.81195	15	9.93048	25	10.06952	9.88148	11	34
27	9.81210	15	9.93073	26	10.06927	9.88137	11	33
28	9.81225	15	9.93099	25	10.06901	9.88126	11	32
29	9.81240	14	9.93124	26	10.06876	9.88115	10	31
30	9.81254	15	9.93150	25	10.06850	9.88105	11	30
31	9.81269	15	9.93175	26	10.06825	9.88094	11	29
32	9.81284	15	9.93201	26	10.06799	9.88083	11	28
33	9.81299	15	9.93227	25	10.06773	9.88072	11	27
34	9.81314	14	9.93252	26	10.06748	9.88061	10	26
35	9.81328	15	9.93278	25	10.06722	9.88051	11	25
36	9.81343	15	9.93303	26	10.06697	9.88040	11	24
37	9.81358	14	9.93329	25	10.06671	9.88029	11	23
38	9.81372	15	9.93354	26	10.06646	9.88018	11	22
39	9.81387	15	9.93380	26	10.06620	9.88007	11	21
40	9.81402	15	9.93406	25	10.06594	9.87996	11	20
41	9.81417	14	9.93431	26	10.06569	9.87985	10	19
42	9.81431	15	9.93457	25	10.06543	9.87975	11	18
43	9.81446	15	9.93482	26	10.06518	9.87964	11	17
44	9.81461	14	9.93508	25	10.06492	9.87953	11	16
45	9.81475	15	9.93533	26	10.06467	9.87942	11	15
46	9.81490	15	9.93559	25	10.06441	9.87931	11	14
47	9.81505	14	9.93584	26	10.06416	9.87920	11	13
48	9.81519	15	9.93610	26	10.06390	9.87909	11	12
49	9.81534	15	9.93636	25	10.06364	9.87898	11	11
50	9.81549	14	9.93661	26	10.06339	9.87887	10	10
51	9.81563	15	9.93687	25	10.06313	9.87877	11	9
52	9.81578	14	9.93712	26	10.06288	9.87866	11	8
53	9.81592	15	9.93738	25	10.06262	9.87855	11	7
54	9.81607	15	9.93763	26	10.06237	9.87844	11	6
55	9.81622	14	9.93789	25	10.06211	9.87833	11	5
56	9.81636	15	9.93814	26	10.06186	9.87822	11	4
57	9.81651	14	9.93840	25	10.06160	9.87811	11	3
58	9.81665	15	9.93865	26	10.06135	9.87800	11	2
59	9.81680	14	9.93891	25	10.06109	9.87789	11	1
60	9.81694		9.93916		10.06034	9.87778		0
	Cof.		Cot.		Tang.	Sin.		

49 Degrees.

41 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.81694	15	9.93916	26	10.06084	9.87778	11	60
1	9.81709	14	9.93942	25	10.06058	9.87767	11	59
2	9.81723	15	9.93967	26	10.06033	9.87756	11	58
3	9.81738	14	9.93993	25	10.06007	9.87745	11	57
4	9.81752	15	9.94018	26	10.05982	9.87734	11	56
5	9.81767	14	9.94044	25	10.05956	9.87723	11	55
6	9.81781	15	9.94069	26	10.05931	9.87712	11	54
7	9.81796	14	9.94095	25	10.05905	9.87701	11	53
8	9.81810	15	9.94120	26	10.05880	9.87690	11	52
9	9.81825	14	9.94146	25	10.05854	9.87679	11	51
10	9.81839	15	9.94171	26	10.05829	9.87668	11	50
11	9.81854	14	9.94197	25	10.05803	9.87657	11	49
12	9.81868	14	9.94222	26	10.05778	9.87646	11	48
13	9.81882	14	9.94248	25	10.05752	9.87635	11	47
14	9.81897	15	9.94273	26	10.05727	9.87624	11	46
15	9.81911	14	9.94299	25	10.05701	9.87613	12	45
16	9.81926	14	9.94324	26	10.05676	9.87601	11	44
17	9.81940	15	9.94350	25	10.05650	9.87590	11	43
18	9.81955	14	9.94375	26	10.05625	9.87579	11	42
19	9.81969	14	9.94401	25	10.05599	9.87568	11	41
20	9.81983	15	9.94426	26	10.05574	9.87557	11	40
21	9.81998	14	9.94452	25	10.05548	9.87546	11	39
22	9.82012	14	9.94477	26	10.05523	9.87535	11	38
23	9.82026	14	9.94503	25	10.05497	9.87524	11	37
24	9.82041	15	9.94528	26	10.05472	9.87513	12	36
25	9.82055	14	9.94554	25	10.05446	9.87501	11	35
26	9.82069	15	9.94579	25	10.05421	9.87490	11	34
27	9.82084	14	9.94604	26	10.05396	9.87479	11	33
28	9.82098	14	9.94630	25	10.05370	9.87468	11	32
29	9.82112	14	9.94655	26	10.05345	9.87457	11	31
30	9.82126	15	9.94681	25	10.05319	9.87446	12	30
31	9.82141	14	9.94706	26	10.05294	9.87434	11	29
32	9.82155	14	9.94732	25	10.05268	9.87423	11	28
33	9.82169	15	9.94757	26	10.05243	9.87412	11	27
34	9.82184	14	9.94783	25	10.05217	9.87401	11	26
35	9.82198	14	9.94808	26	10.05192	9.87390	12	25
36	9.82212	14	9.94834	25	10.05166	9.87378	11	24
37	9.82226	14	9.94859	25	10.05141	9.87367	11	23
38	9.82240	14	9.94884	26	10.05116	9.87356	11	22
39	9.82255	15	9.94910	25	10.05090	9.87345	11	21
40	9.82269	14	9.94935	26	10.05065	9.87334	12	20
41	9.82283	14	9.94961	25	10.05039	9.87322	11	19
42	9.82297	14	9.94986	25	10.05014	9.87311	11	18
43	9.82311	14	9.95012	26	10.04988	9.87300	12	17
44	9.82326	15	9.95037	25	10.04963	9.87288	11	16
45	9.82340	14	9.95062	25	10.04938	9.87277	11	15
46	9.82354	14	9.95088	26	10.04912	9.87266	11	14
47	9.82368	14	9.95113	25	10.04887	9.87255	12	13
48	9.82382	14	9.95138	26	10.04861	9.87243	12	12
49	9.82396	14	9.95164	25	10.04836	9.87232	11	11
50	9.82410	14	9.95190	26	10.04810	9.87221	11	10
51	9.82424	15	9.95215	25	10.04785	9.87209	12	9
52	9.82439	14	9.95240	26	10.04760	9.87198	11	8
53	9.82453	14	9.95266	25	10.04734	9.87187	11	7
54	9.82467	14	9.95291	26	10.04709	9.87175	12	6
55	9.82481	14	9.95317	25	10.04683	9.87164	11	5
56	9.82495	14	9.95342	26	10.04658	9.87153	11	4
57	9.82509	14	9.95368	25	10.04632	9.87141	12	3
58	9.82523	14	9.95393	25	10.04607	9.87130	11	2
59	9.82537	14	9.95418	26	10.04582	9.87119	11	1
60	9.82551	14	9.95444		10.04556	9.87107	12	0
	Cof.		Cot.		Tang.	Sin.		

48 Degrees.

42 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cot.	D.	′
0	9.82551	14	9.95444	25	10.04556	9.87107	11	60
1	9.82565	14	9.95469	26	10.04531	9.87096	11	59
2	9.82579	14	9.95495	25	10.04505	9.87085	12	58
3	9.82593	14	9.95520	25	10.04480	9.87073	11	57
4	9.82607	14	9.95545	26	10.04455	9.87062	12	56
5	9.82621	14	9.95571	25	10.04429	9.87050	11	55
6	9.82635	14	9.95596	26	10.04404	9.87039	11	54
7	9.82649	14	9.95622	25	10.04378	9.87028	12	53
8	9.82663	14	9.95647	25	10.04353	9.87016	11	52
9	9.82677	14	9.95672	26	10.04328	9.87005	12	51
10	9.82691	14	9.95698	25	10.04202	9.86993	11	50
11	9.82705	14	9.95723	25	10.04277	9.86982	12	49
12	9.82719	14	9.95748	26	10.04252	9.86970	11	48
13	9.82733	14	9.95774	25	10.04226	9.86959	12	47
14	9.82747	14	9.95799	26	10.04201	9.86947	11	46
15	9.82761	14	9.95825	25	10.04175	9.86936	12	45
16	9.82775	13	9.95850	25	10.04150	9.86924	11	44
17	9.82788	14	9.95875	26	10.04125	9.86913	11	43
18	9.82802	14	9.95901	25	10.04099	9.86902	12	42
19	9.82816	14	9.95926	26	10.04074	9.86890	11	41
20	9.82830	14	9.95952	25	10.04048	9.86879	12	40
21	9.82844	14	9.95977	25	10.04023	9.86867	12	39
22	9.82858	14	9.96002	26	10.03998	9.86855	11	38
23	9.82872	13	9.96028	25	10.03972	9.86844	12	37
24	9.82885	14	9.96053	25	10.03947	9.86832	11	36
25	9.82899	14	9.96078	26	10.03922	9.86821	12	35
26	9.82913	14	9.96104	25	10.03896	9.86809	11	34
27	9.82927	14	9.96129	26	10.03871	9.86798	12	33
28	9.82941	14	9.96155	25	10.03845	9.86786	11	32
29	9.82955	13	9.96180	25	10.03820	9.86775	12	31
30	9.82968	14	9.96205	26	10.03795	9.86763	11	30
31	9.82982	14	9.96231	25	10.03769	9.86752	12	29
32	9.82996	14	9.96256	25	10.03744	9.86740	12	28
33	9.83010	13	9.96281	26	10.03719	9.86728	11	27
34	9.83023	14	9.96307	25	10.03693	9.86717	12	26
35	9.83037	14	9.96332	25	10.03668	9.86705	11	25
36	9.83051	14	9.96357	26	10.03643	9.86694	12	24
37	9.83065	13	9.96383	25	10.03617	9.86682	12	23
38	9.83078	14	9.96408	25	10.03592	9.86670	11	22
39	9.83092	14	9.96433	26	10.03567	9.86659	12	21
40	9.83106	14	9.96459	25	10.03541	9.86647	12	20
41	9.83120	13	9.96484	26	10.03516	9.86635	11	19
42	9.83133	14	9.96510	25	10.03490	9.86624	12	18
43	9.83147	14	9.96535	25	10.03465	9.86612	12	17
44	9.83161	13	9.96560	26	10.03440	9.86600	11	16
45	9.83174	14	9.96586	25	10.03414	9.86589	12	15
46	9.83188	14	9.96611	25	10.03389	9.86577	12	14
47	9.83202	13	9.96636	26	10.03364	9.86565	11	13
48	9.83215	14	9.96662	25	10.03338	9.86554	12	12
49	9.83229	13	9.96687	25	10.03313	9.86542	12	11
50	9.83242	14	9.96712	26	10.03288	9.86530	12	10
51	9.83256	14	9.96738	25	10.03262	9.86518	11	9
52	9.83270	13	9.96763	25	10.03237	9.86507	12	8
53	9.83283	14	9.96788	26	10.03212	9.86495	12	7
54	9.83297	13	9.96814	25	10.03186	9.86483	11	6
55	9.83310	14	9.96839	25	10.03161	9.86472	12	5
56	9.83324	14	9.96864	26	10.03136	9.86460	12	4
57	9.83338	13	9.96890	25	10.03110	9.86448	12	3
58	9.83351	14	9.96915	25	10.03085	9.86436	11	2
59	9.83365	13	9.96940	26	10.03060	9.86425	12	1
60	9.83378	13	9.96966	25	10.03034	9.86413	12	0
′	Col.	D.	Cot.	D.	Tang.	Sin.	D.	′

47 Degrees.

43 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Col.	D.	′
0	9.83378	14	9.96966	25	10.03034	9.86413	12	60
1	9.83392	13	9.96991	25	10.03009	9.86401	12	59
2	9.83405	14	9.97016	26	10.02984	9.86389	12	58
3	9.83419	13	9.97042	25	10.02958	9.86377	11	57
4	9.83432	14	9.97067	25	10.02933	9.86366	12	56
5	9.83446	13	9.97092	26	10.02908	9.86354	12	55
6	9.83459	14	9.97118	25	10.02882	9.86342	12	54
7	9.83473	13	9.97143	25	10.02857	9.86330	12	53
8	9.83486	14	9.97168	25	10.02832	9.86318	12	52
9	9.83500	13	9.97193	26	10.02807	9.86306	11	51
10	9.83513	14	9.97219	25	10.02781	9.86295	12	50
11	9.83527	13	9.97244	25	10.02756	9.86283	12	49
12	9.83540	14	9.97269	26	10.02731	9.86271	12	48
13	9.83554	13	9.97295	25	10.02705	9.86259	12	47
14	9.83567	14	9.97320	25	10.02680	9.86247	12	46
15	9.83581	13	9.97345	26	10.02655	9.86235	12	45
16	9.83594	14	9.97371	-	10.02629	9.86223	12	44
17	9.83608	13	9.97396	25	10.02604	9.86211	11	43
18	9.83621	13	9.97421	25	10.02579	9.86200	12	42
19	9.83634	14	9.97447	26	10.02553	9.86188	12	41
20	9.83648	13	9.97472	25	10.02528	9.86176	12	40
21	9.83661	13	9.97497	25	10.02503	9.86164	12	39
22	9.83674	14	9.97523	26	10.02477	9.86152	12	38
23	9.83688	13	9.97548	25	10.02452	9.86140	12	37
24	9.83701	14	9.97573	25	10.02427	9.86128	12	36
25	9.83715	13	9.97598	25	10.02402	9.86116	12	35
26	9.83728	13	9.97624	26	10.02376	9.86104	12	34
27	9.83741	14	9.97649	25	10.02351	9.86092	12	33
28	9.83755	13	9.97674	25	10.02326	9.86080	12	32
29	9.83768	13	9.97700	26	10.02300	9.86068	12	31
30	9.83781	14	9.97725	25	10.02275	9.86056	12	30
31	9.83795	13	9.97750	25	10.02250	9.86044	12	29
32	9.83808	13	9.97776	26	10.02224	9.86032	12	28
33	9.83821	13	9.97801	25	10.02199	9.86020	12	27
34	9.83834	14	9.97826	25	10.02174	9.86008	12	26
35	9.83848	13	9.97851	25	10.02149	9.85996	12	25
36	9.83861	13	9.97877	26	10.02123	9.85984	12	24
37	9.83874	13	9.97902	25	10.02098	9.85972	12	23
38	9.83887	14	9.97927	25	10.02073	9.85960	12	22
39	9.83901	13	9.97953	26	10.02047	9.85948	12	21
40	9.83914	13	9.97978	25	10.02022	9.85936	12	20
41	9.83927	13	9.98003	25	10.01997	9.85924	12	19
42	9.83940	14	9.98029	26	10.01971	9.85912	12	18
43	9.83954	13	9.98054	25	10.01946	9.85900	12	17
44	9.83967	13	9.98079	25	10.01921	9.85888	12	16
45	9.83980	13	9.98104	25	10.01896	9.85876	12	15
46	9.83993	13	9.98130	26	10.01870	9.85864	13	14
47	9.84006	14	9.98155	25	10.01845	9.85851	12	13
48	9.84020	13	9.98180	25	10.01820	9.85839	12	12
49	9.84033	13	9.98206	26	10.01794	9.85827	12	11
50	9.84046	13	9.98231	25	10.01769	9.85815	12	10
51	9.84059	13	9.98256	25	10.01744	9.85803	12	9
52	9.84072	13	9.98281	25	10.01719	9.85791	12	8
53	9.84085	13	9.98307	26	10.01693	9.85779	13	7
54	9.84098	13	9.98332	25	10.01668	9.85766	12	6
55	9.84112	14	9.98357	25	10.01643	9.85754	12	5
56	9.84125	13	9.98383	26	10.01617	9.85742	12	4
57	9.84138	13	9.98408	25	10.01592	9.85730	12	3
58	9.84151	13	9.98433	25	10.01567	9.85718	12	2
59	9.84164	13	9.98458	25	10.01542	9.85706	13	1
60	9.84177	13	9.98484	26	10.01516	9.85693	13	0
′	Col.	D.	Cot.	D.	Tang.	Sin.	D.	′

46 Degrees.

44 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
0	9.84177	13	9.98484	25	10.01516	9.85693	12	60
1	9.84190	13	9.98509	25	10.01491	9.85681	12	59
2	9.84203	13	9.98534	26	10.01466	9.85669	12	58
3	9.84216	13	9.98560	25	10.01440	9.85657	12	57
4	9.84229	13	9.98585	25	10.01415	9.85645	13	56
5	9.84242	13	9.98610	25	10.01390	9.85632	12	55
6	9.84255	14	9.98635	26	10.01365	9.85620	12	54
7	9.84269	13	9.98661	25	10.01339	9.85608	12	53
8	9.84282	13	9.98686	25	10.01314	9.85596	13	52
9	9.84295	13	9.98711	26	10.01289	9.85583	12	51
10	9.84308	13	9.98737	25	10.01263	9.85571	12	50
11	9.84321	13	9.98762	25	10.01238	9.85559	12	49
12	9.84334	13	9.98787	25	10.01213	9.85547	13	48
13	9.84347	13	9.98812	26	10.01188	9.85534	12	47
14	9.84360	13	9.98838	25	10.01162	9.85522	12	46
15	9.84373	12	9.98863	25	10.01137	9.85510	13	45
16	9.84385	13	9.98888	25	10.01112	9.85497	12	44
17	9.84398	13	9.98913	26	10.01087	9.85485	12	43
18	9.84411	13	9.98939	25	10.01061	9.85473	13	42
19	9.84424	13	9.98964	25	10.01036	9.85460	12	41
20	9.84437	13	9.98989	26	10.01011	9.85448	12	40
21	9.84450	13	9.99015	25	10.00985	9.85436	13	39
22	9.84463	13	9.99040	25	10.00960	9.85423	12	38
23	9.84476	13	9.99065	25	10.00935	9.85411	12	37
24	9.84489	13	9.99090	26	10.00910	9.85399	13	36
25	9.84502	13	9.99116	25	10.00884	9.85386	12	35
26	9.84515	13	9.99141	25	10.00859	9.85374	13	34
27	9.84528	12	9.99166	25	10.00834	9.85361	12	33
28	9.84540	13	9.99191	26	10.00809	9.85349	12	32
29	9.84553	13	9.99217	25	10.00783	9.85337	13	31
30	9.84566		9.99242		10.00758	9.85324		30
	Cof.		Cot.		Tang.	Sin.		

45 Degrees.

44 Degrees.

′	Sin.	D.	Tang.	D.	Cot.	Cof.	D.	′
30	9.84566	13	9.99242	25	10.00758	9.85324	12	30
31	9.84579	13	9.99267	26	10.00733	9.85312	13	29
32	9.84592	13	9.99293	25	10.00707	9.85299	12	28
33	9.84605	13	9.99318	25	10.00682	9.85287	13	27
34	9.84618	12	9.99343	25	10.00657	9.85274	12	26
35	9.84630	13	9.99368	26	10.00632	9.85262	12	25
36	9.84643	13	9.99394	25	10.00606	9.85250	13	24
37	9.84656	13	9.99419	25	10.00581	9.85237	12	23
38	9.84669	13	9.99444	25	10.00556	9.85225	13	22
39	9.84682	13	9.99469	26	10.00531	9.85212	12	21
40	9.84694	13	9.99495	25	10.00505	9.85200	13	20
41	9.84707	13	9.99520	25	10.00480	9.85187	12	19
42	9.84720	13	9.99545	25	10.00455	9.85175	13	18
43	9.84733	13	9.99570	26	10.00430	9.85162	12	17
44	9.84745	13	9.99596	25	10.00404	9.85150	13	16
45	9.84758	13	9.99621	25	10.00379	9.85137	12	15
46	9.84771	13	9.99646	26	10.00354	9.85125	13	14
47	9.84784	12	9.99672	25	10.00328	9.85112	12	13
48	9.84796	13	9.99697	25	10.00303	9.85100	13	12
49	9.84809	13	9.99722	25	10.00278	9.85087	13	11
50	9.84822	13	9.99747	26	10.00253	9.85074	12	10
51	9.84835	12	9.99773	25	10.00227	9.85062	13	9
52	9.84847	13	9.99798	25	10.00202	9.85049	12	8
53	9.84860	13	9.99823	25	10.00177	9.85037	13	7
54	9.84873	12	9.99848	26	10.00152	9.85024	12	6
55	9.84885	13	9.99874	25	10.00126	9.85012	13	5
56	9.84898	13	9.99899	25	10.00101	9.84999	13	4
57	9.84911	13	9.99924	25	10.00076	9.84986	12	3
58	9.84923	13	9.99949	26	10.00051	9.84974	13	2
59	9.84936	13	9.99975	25	10.00025	9.84961	12	1
60	9.84949		0.00000		10.00000	9.84949		0
	Cof.		Cot.		Tang.	Sin.		

45 Degrees.

LOG

Logarithmic curve.

LOGARITHMIC CURVE. If on the line AN both ways indefinitely extended, be taken AC, CE, EG, GI, IL, on the left hand; and alſo A *g*, *g* P, &c. on the right, all equal to one another; and if at the points P *g*, A, C, E, G, I, L, be erected to the right line AN, the perpendiculars PS, *g d*, AB, CD, EF, GH, IK, LM, which let be continually proportional, and repreſent numbers, viz. AB, 1; CD, 10; EF, 100, &c. then ſhall we have two progreſſions of lines, arithmetical and geometrical: for the lines AC, AE, AG, &c. are in arithmetical progreſſion, or as 1, 2, 3, 4, 5. &c, and ſo repreſent the logarithms to which the geometrical lines AB, CD, EF, &c. do correſpond. For ſince AG is triple of the firſt line AC, the number GH ſhall be in the third place from unity, if CD be in the firſt: ſo likewiſe ſhall LM be in the fifth place, ſince AL = 5 AC. If the extremities of the proportionals S, *d*, B, D, F, &c. be joined by right lines, the figures SBML will become a polygon, conſiſting of more or leſs ſides, according as there are more or leſs terms in the progreſſion.

Plate CCXCVII. fig. 3.

If the parts AC, CE, EG, &c. be biſected in the points *c*, *e*, *g*, *i*, *l*, and there be again raiſed the perpendiculars, *c d*, *e f*, *g h*, *i k*, *l m*, which are mean proportionals between AB, CD, CD, EF, &c. then there

LOG

will ariſe a new ſeries of proportionals whoſe terms, beginning from that which immediately follows unity, are double of thoſe in the firſt ſeries, and the difference of the terms is become leſs, and approaches nearer to a ratio of equality than before. Likewiſe, in this new ſeries, the right lines, AL, A *c*, expreſs the diſtances of the terms LM *c d*, from unity, viz. ſince AL is ten times greater than A *c*, LM ſhall be the tenth term of the ſeries from unity; and becauſe A *e* is three times greater than A *c*, *e f* will be the third term of the ſeries if *c d* be the firſt, and there ſhall be two mean proportionals between AB and *e f*, and between AB and LM there will be nine mean proportionals. And if the extremities of the lines B *d*, D *f*, F *h*, &c. be joined by right lines, there will be a new polygon made, conſiſting of more but ſhorter ſides than the laſt.

Logarithmic curve.

If, in this manner, mean proportionals be continually placed between every two terms, the number of terms at laſt will be made ſo great, as alſo the number of the ſides of the polygon, as to be greater than any given number, or to be infinite; and every ſide of the polygon ſo leſſened, as to become leſs than any given right line; and conſequently the polygon will be changed into a curve-lined figure; for any curve-lined figure may be conceived as a polygon, whoſe ſides are infinitely

Logarithmic Curve, Logarithmic Lines.

infinitely small and infinite in number. A curve described after this manner is called *logarithmical*.

It is manifest from this description of the logarithmic curve, that all numbers at equal distances are continually proportional. It is also plain, that if there be four numbers, AB, CD, IK, LM, such that the distance between the first and second be equal to the distance between the third and the fourth, let the distance from the second to the third be what it will, these numbers will be proportional. For because the distances AC, IL, are equal, AB shall be to the increment D *s*, as IK is to the increment MT. Wherefore, by composition, AB : DC :: IK : ML. And, contrariwise, if four numbers be proportional, the distance between the first and second shall be equal to the distance between the third and fourth.

The distance between any two numbers is called *the logarithm of the ratio of those numbers*; and, indeed, doth not measure the ratio itself, but the number of terms in a given series of geometrical proportionals, proceeding from one number to another, and defines the number of equal ratios by the composition whereof the ratios of number is known.

Logarithmic Lines. For many mechanical purposes it is convenient to have the logarithms of numbers laid down on scales, as well as the logarithmic sines and tangents; by which means computations may be carried on by mere mensuration with compasses. Lines of this kind are always put on the common Gunter's scale; but as these instruments must be extended to a very great length, in order to contain any considerable quantity of numbers, it becomes an object of importance to shorten them. Such an improvement has been made by Mr William Nicholson, and published in the 77th volume of the Philosophical Transactions. The principles on which the construction of his instruments depends are as follow:

1. If two geometrical series of numbers, having the same common ratio, be placed in order with the terms opposite to each other, the ratio between any term in one series and its opposite in the other will be constant: Thus,

2 6 18 54 162, &c.
3 9 27 81 243, &c. Then,
2 3 6 9 18 27 54 81 162 243, &c.

where it is evident, that each of the terms in the upper series is exactly two-thirds of the corresponding one in the lower.

2. The ratio of any two terms in one series will be the same with that between those which have an equal distance in the other.

3. In all such geometrical series as have the same ratio, the property above mentioned takes place, though we compare the terms of any series with those of another: Thus,

2 4 8 16 32 64, &c.
3 6 12 24 48 96, &c.
4 8 16 32 64 128, &c.
5 10 20 40 80 160, &c.; where it is plain that 2, 4, 3, 6; also 2, 4, 4, 8, and 2, 4, 5, 10, &c. have the same ratio with that of each series.

4. If the differences of the logarithms of the numbers be laid in order upon equidistant parallel right lines, in such a manner that a right line drawn across the whole shall intersect it at divisions denoting numbers in geometrical progression; then, from the condition of the arrangement, and the property of this logarithmic line, it follows, 1st, That every right line so drawn will, by its intersections, indicate a geometrical series of numbers; 2dly, That such series as are indicated by these right lines will have the same common ratio; and, 3dly, That the series thus indicated by two parallel right lines, supposed to move laterally, without changing either their mutual distance or parallelism to themselves, will have each the same ratio and in all series indicated by such two lines, the ratio between an antecedent and consequent; the former taken upon one line, and the latter upon another, will be also the same. Logarithmic Lines.

The 1st of these propositions is proved in the following manner. Let the lines AB, CD, EF, represent parts of the logarithmic line arranged according to the proportion already mentioned; and let GH be a right line passing through the points *e*, *c*, *a*, denoting numbers in geometrical progression; then will any other line IK, drawn across the arrangement, likewise pass through three points *f*, *d*, *b*, in geometrical progression. From one of the points of intersection *f* in the last-mentioned line IK, draw the line *f g* parallel to GH, and intersecting the arrangements in the points *i*, *h*; and the ratios of the numbers *e*, *f c i*, will be equal, as well as of *a h*; because the intervals on the logarithmic line, or differences of the logarithms of those numbers, are equal. Again, the point *f*, the line *i d*, and the line *h b*, are in arithmetical progression denoting the differences between the logarithms of the numbers themselves; whence the quotients of the numbers are in geometrical progression. Plate CCXCVII. fig. 11.

The 2d proposition is proved in a similar manner. For as it was shown that the line *f g*, parallel to GH, passes through points of division denoting numbers in the same continued ratio as those indicated by the line GH; it may also be shown, that the line LM parallel to any other line IK, will pass through a series of points denoting numbers which have the same continued ratio with those indicated by the line IK, to which it is parallel.

The 3d proposition arises from the parallelism of the lines to their former situation; by which means they indicate numbers in a geometrical series, having the same common ratio as before: their distance on the logarithmic line also remains unchanged: whence the differences between the logaritbms of the opposite numbers, and of consequence their ratios, will always be constant.

5. Supposing now an antecedent and consequent to be given in any geometrical series, it will always be possible to find them, provided the line be of unlimited length. Drawing two parallel lines, then, through each of the numbers, and supposing the lines to move without changing their direction or parallel situation, they will continually describe new antecedents and consequents in the same geometrical series as before.

6. Though the logarithmic line contain no greater range of numbers than from 1 to 10, it will not be found necessary for the purposes of computation to repeat it. The only thing requisite is to have a slider or beam with two fixed points at the distance of the interval betwixt 1 and 10, and a moveable point made to range betwixt them always to indicate the antecedent; then, if the consequent fixed point fall without

Logarithmic Lines.

out the rule, the other fixed point will always denote the division on which it would have fallen had the rule been prolonged; and this contrivance may easily be adapted to any arrangement of parallel lines whatever. The arrangement of right lines, however, ought always to be disposed in such a manner as to occupy a right-angled parallelogram, or the cross line already mentioned ought always to be at right angles to the length of the ruler.

Fig. 7. is a ruler consisting of ten parallel lines.—Fig. 8. a beam compass for measuring the intervals. B, A, C, are the parts which apply to the surface of the ruler; the middle one, A, being moveable sidewise in a groove in the piece DE, so as always to preserve its parallelism to the external pieces DC, which are fixed at a distance equal to the length of the ruler, and have their edges placed in such a manner as to form with the parallel lines which they intersect a ratio, which by composition is $\frac{1}{10}$; which in the present case requires them to be at right angles to the length. The piece DE is applied to the edge FG of the ruler. The edges or borders H, I, K, L, are more conveniently made of transparent horn, or tortoise-shell, than of any opaque matter.

In using this ruler, apply the edge of either B or C to the consequent, and slide the piece A to the antecedent; observing the difference between the numbers on the pieces denoting the lines they are found on: then, applying the same edge of A to any other antecedent, the other piece B or C will intersect a consequent in the same ratio upon that line, having the same situation with regard to the antecedent that the line of the former consequent had to its antecedent. But if B be the consequent piece, and fall without the ruler, the piece C will show the consequent one line lower; or if C, in like manner, fall without the ruler, then B will show the consequent one line higher.—"It might be convenient (says Mr Nicholson) for the purpose of computation, to make instruments of this kind with one hundred or more lines: but in the present instrument, the numbers on the pieces will answer the same purpose; for if a consequent fall upon a line at any given number of intervals without the ruler, it will be found on that line of the arrangement which occupies the same number of intervals reckoned inwards from the opposite edge of the ruler."

Fig. 9. is an instrument on the plan of a Gunter's scale of $28\frac{1}{2}$ inches long, invented by Mr Robertson. There is a moveable piece AB in the slider GH, across which is drawn a fine line: the slider having also lines CD, EF, drawn across it at distances from each other equal to the length of the ruler AB. In using the instrument, the line CD or EF is to be placed at the consequent, and the line in AB at the antecedent: then, if the piece AB be placed at any other antecedent, the same line CD or EF will indicate its consequent in the same ratio taken the same way: that is, if the antecedent and consequent lie on the same side of the slider, all other antecedents and consequents in that ratio will be in the same manner; and the contrary if they do not. But if the consequent line fall without the ruler, the other fixed line on the slider will show the consequent, but on the contrary side of the slider to that where it would else have been seen by means of the first consequent line.

Fig. 10. is a circular instrument equivalent to the former: consisting of three concentric circles engraved and graduated upon a plate of an inch and a half diameter. Two legs A and B proceed from the centre, having right-lined edges in the direction of radii; and are moveable either singly or together. In using the instrument, place one of the edges at the antecedent and the other at the consequent, and fix them at the angle. Move the two legs then together; and having placed the antecedent leg at any other number, the other will give the consequent one in the like position on the lines. If the line CD happen to lie between the legs, and B be the consequent leg, the number sought will be found one line farther from the centre than it would otherwise have been; and on the contrary, it will be found one line nearer in the like case, if A be the consequent leg. "This instrument (says Mr Nicholson) differing from that represented fig. 7. only in its circular form, and the advantages resulting from that form, the lines must be taken to succeed each other in the same manner laterally; so that numbers which fall either within or without the arrangement of circles, will be found on such lines of the arrangement as would have occupied the vacant places if the succession of lines had been indefinitely repeated sidewise.

"I approve of this construction as superior to every other which has yet occurred to me, not only in point of convenience, but likewise in the probability of being better executed; because small ares may be graduated with very great accuracy, by divisions transferred from a larger original. The instrument, fig. 7. may be contained conveniently in a circle of about four inches and a half diameter.

"The circular instrument is a combination of the Gunter's line and the sector, with the improvements here pointed out. The property of the sector may be useful in magnifying the differences of the logarithms in the upper parts of the line of sines, the middle of the tangents, and the beginning of the versed sines. It is even possible, as mathematicians will easily conceive, to draw spirals, on which graduations of parts, everywhere equal to each other, will show the ratios of those lines by moveable radii, similar to those in this instrument."

LOGIC.

LOGIC is the art of thinking and reasoning justly; or, it may be defined the science or history of the human mind, inasmuch as it traces the progress of our knowledge from our first and most simple conceptions through all their different combinations, and all those numerous deductions that result from variously comparing them one with another.

The precise business of logic therefore is, To explain the nature of the human mind, and the proper manner of conducting its several powers, in order to the attainment

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ment of truth and knowledge. It lays open those errors and mistakes we are apt, through inattention, to run into; and teaches us how to distinguish between truth, and what only carries the appearance of it. By these means we grow acquainted with the nature and force of the understanding; see what things lie within its reach; where we may attain certainty and demonstration; and when we must be contented with probability.

This science is generally divided into four parts, viz. *Perception*, *Judgment*, *Reasoning*, and *Method*. This division comprehends the whole history of the sensations and operations of the human mind.

PART I. OF PERCEPTION.

WE find ourselves surrounded with a variety of objects, which acting differently upon our senses, convey distinct impressions into the mind, and thereby rouse the attention and notice of the understanding. By reflecting too on what passes within us, we become sensible of the operations of our own minds, and attend to them as a new set of impressions. But in all this there is only bare *consciousness*. The mind, without proceeding any farther, takes notice of the impressions that are made upon it, and views things in order, as they present themselves one after another. This attention of the understanding to the object acting upon it, whereby it becomes sensible of the impressions they make, is called by logicians *perception*; and the notices themselves, as they exist in the mind, and are there treasured up to be the materials of thinking and knowledge, are distinguished by the name of *ideas*. In the article METAPHYSICS it shall be shown at large, how the mind, being furnished with ideas, contrives to diversify and enlarge its stock: we have here chiefly to consider the means of making known our thoughts to others; that we may not only understand how knowledge is acquired, but also in what manner it may be communicated with the greatest certainty and advantage.

CHAP. I. *Of Words, considered as the signs of our Ideas.*

1 Words furnish the means of recording our own thoughts;

I. OUR ideas, though manifold and various, are nevertheless all within our own breasts, invisible to others, nor can of themselves be made appear. But God, designing us for society, and to have fellowship with those of our kind, has provided us with organs fitted to frame articulate sounds, and given us also a capacity of using those sounds as signs of internal conceptions. Hence spring words and language: for, having once pitched upon any sound to stand as the mark of an idea in the mind, custom by degrees establishes such a connection between them, that the appearance of the idea in the understanding always brings to our remembrance the sound or name by which it is expressed; as in like manner the hearing of the sound never fails to excite the idea for which it is made to stand. And thus it is easy to conceive how a man may record his own thoughts, and bring them again into view in any succeeding period of life. For this connection being once settled, as the same sounds will always serve to excite the same ideas; if he can but contrive to register his words in the order and disposition in which the present train of his thoughts present themselves to his imagination, it is evident he will be able to recal these thoughts at pleasure, and that too in the very manner of their first appearance. Accordingly we find, that the inventions of writing and printing, by enabling us to fix and perpetuate such perishable things as sounds, have also furnished us with the means of giving a kind of permanency to the transactions of the mind, insomuch that they may be in the same manner subjected to our review as any other objects of nature.

2 and of the mutual communication of knowledge from one man to another.

II. But besides the ability of recording our own thoughts, there is this farther advantage in the use of external signs, that they enable us to communicate our thoughts to *others*, and also to receive information of what passes in *their* breasts. For any number of men, having agreed to establish the same sounds as signs of the same ideas, it is apparent, that the repetition of these sounds must excite the like perceptions in each, and create a perfect correspondence of thoughts. When, for instance, any train of ideas succeed one another in my mind, if the names by which I am wont to express them have been annexed by those with whom I converse to the very same set of ideas, nothing is more evident, than that, by repeating those names according to the tenor of my present conceptions, I shall raise in their minds the same course of thought as has taken possession of my own. For by barely attending to what passes within themselves upon hearing the sounds which I repeat, they will also become acquainted with the ideas in my understanding, and have them in a manner laid before their view. So that we here clearly perceive how a man may communicate his sentiments, knowledge, and discoveries to others, if the language in which he converses be extensive enough to mark all the ideas and transactions of his mind. But as this is not always the case, and men are often obliged to invent terms of their own to express new views and conceptions of things; it may be asked, how in these circumstances we can become acquainted with the thoughts of another, when he makes use of words, to which we have never annexed any ideas, and that of course can raise no perceptions in our minds? In order to unveil this mystery, and give some little insight into the foundation, growth, and improvement of language, the following observations will be found of considerable moment.

3 Simple ideas cannot be conveyed into the mind by words.

III. First, That no word can be to any man the sign of an idea, till that idea comes to have a real existence in his mind. For names, being only so far intelligible as they denote known internal conceptions; where they have none such to answer them, there they are plainly sounds without signification, and of a discourse convey no instruction or knowledge. But no sooner are the ideas to which they belong raised in the understanding, than, finding it easy to connect them with the established names, we can join in any agreement of this kind made by others, and thereby enjoy the

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benefit of their discoveries. The first thing therefore to be considered is, how these ideas may be conveyed into the mind; that being there, we may learn to connect them with their appropriated sounds, and so become capable of understanding others when they make use of these sounds in laying open and communicating their thoughts. Now, to comprehend this distinctly, it will be necessary to attend to the division of our ideas into simple and complex, (see METAPHYSICS). And first, as for our simple ideas; they can find no admission into the mind, but by the two original fountains of knowledge, sensation and reflection. If therefore any of these have as yet no being in the understanding, it is impossible by words or a description to excite them there. A man who had never felt the sensation of *heat*, could not be brought to comprehend that sensation by any thing we might say to explain it. If we would really produce the idea in him, it must be by applying the proper object to his senses, and bringing him within the influence of a hot body. When this is done, and experience has taught him the perception to which men have annexed the name *heat*, it then becomes to him the sign of that idea, and he thenceforth understands the meaning of the term, which, before, all the words in this world would not have been sufficient to convey into his mind. The case is the same in respect of light and colours. A man born blind, and thereby deprived of the only conveyance for the ideas of this class, can never be brought to understand the names by which they are expressed. The reason is plain: they stand for ideas that have no existence in his mind; and as the organ appropriated to their reception is wanting, all other contrivances are vain, nor can they by any force or description be raised in his imagination. But it is quite otherwise in our complex notions. For these being no more than certain combinations of simple ideas, put together in various forms; if the original ideas out of which the collections are made have already got admission into the understanding, and the names serving to express them are known; it will be easy, by enumerating the several ideas concerned in the composition, and marking the order and manner in which they are united, to raise any complex conception in the mind. Thus the idea answering to the word *rainbow* may be readily excited in the imagination of another who has never seen the appearance itself, by barely describing the figure, largeness, position, and order of colours; if we suppose these several simple ideas, with their names, sufficiently known to him.

4 The names of complex ideas definable; those of simple ideas not.

IV. And this leads to a second observation upon this subject, namely, That words standing for complex ideas are all definable, but those by which we denote simple ideas are not; for simple ideas being secondary perceptions, which have no other entrance into the mind than by sensation or reflection, can only be got by experience, from the several objects of nature, proper to produce those perceptions in us. Words indeed may very well serve to remind us of them, if they have already found admission into the understanding, and their connexion with the established names is known; but they can never give them their original being and existence there. And hence it is, that when any one asks the meaning of a word denoting a simple idea, we pretend not to explain it to him by a definition, well knowing that to be impossible; but, supposing him already acquainted with the idea, and only ignorant of the name by which it is called, we either mention it to him by some other name with which we presume he knows its connexion, or appeal to the object where the idea itself is found. Thus, were any one to ask the meaning of the work *white*, we should tell him it stood for the same idea as *albus* in Latin, or *blanc* in French; or, if we thought him a stranger to these languages, we might appeal to an object producing the idea, by saying it denoted the colour we observe in *snow* or *milk*. But this is by no means a definition of the word, exciting a new idea in his understanding; but merely a contrivance to remind him of a known idea, and teach him its connexion with the established name. For if the ideas after which he inquires have never yet been raised in his mind; as suppose one who had seen no other colours than *black* and *white*, should ask the meaning of the word *scarlet*; it is easy to perceive, that it would be no more possible to make him comprehend it by words, or a definition, than to introduce the same perception into the imagination of a man born blind. The only method in this case is, to present some object, by looking at which the perception itself may be excited; and thus he will learn both the name and the idea together.

5 Experience and observation bring men to an agreement in the names of simple ideas.

V. But how comes it to pass that men agree in the names of their simple ideas, seeing they cannot view the perceptions in one another's minds, nor make known these perceptions by words to others? The effect is produced by experience and observation. Thus finding, for instance, that the name of *heat* is annexed to that sensation which men feel when they approach the fire, I make it also the sign of the sensation excited in me by such an approach, nor have any doubt but it denotes the same perception in my mind as in theirs. For we are naturally led to imagine, that the same objects operate alike upon the organs of the human body, and produce an uniformity of sensations. No man fancies, that the idea raised in him by the taste of *sugar*, and which he calls *sweetness*, differs from that excited in another by the like means; or that *wormwood*, to whose relish he has given the epithet *bitter*, produces in another the sensation which he denotes by the word *sweet*. Presuming therefore upon this conformity of perceptions, when they arise from the same objects, we easily agree as to the names of our simple ideas: and if at any time, by a more narrow scrutiny into things, new ideas of this class come in our way, which we choose to express by terms of our own invention; these names are explained, not by a definition, but by referring to the objects whence the ideas themselves may be obtained.

6 The conveyance of complex ideas by definitions, a wise contrivance in nature;

VI. Being in this manner furnished with simple ideas, and the names by which they are expressed; the meaning of terms that stand for complex ideas is easily got, because the ideas themselves answering to these terms may be conveyed into the mind by definitions. For our complex notions are only certain combinations of simple ideas. When therefore these are enumerated, and the manner in which they are united into one conception explained, nothing more is wanting to raise that conception in the understanding; and thus the term denoting it comes of course to be understood. And here it is worth while to reflect.

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a little upon the wise contrivance of nature, in thus furnishing us with the very aptest means of communicating our thoughts. For were it not so ordered, that we could thus convey our complex ideas from one to another by definitions, it would in many cases be impossible to make them known at all. This is apparent in those ideas which are the proper work of the mind. For as they exist only in the understanding, and have no real objects in nature in conformity to which they are framed; if we could not make them known by description, they must lie for ever hid within our own breasts, and be confined to the narrow acquaintance of a single mind. All the fine scenes that arise from time to time in the poet's fancy, and by his lively painting give such entertainment to his readers, were he destitute of this faculty of laying them open to the view of others by words and description, could not extend their influence beyond his own imagination, or give joy to any but the original inventor.

7 and of great avail towards the improvement of knowledge.

VII. There is this farther advantage in the ability we enjoy of communicating our complex notions by definitions; that as these make by far the largest class of our ideas, and most frequently occur in the progress and improvement of knowledge, so they are by these means imparted with the greatest readiness, than which nothing would tend more to the increase and spreading of science: for a definition is soon perused; and if the terms of it are well understood, the idea itself finds an easy admission into the mind. Whereas, in simple perceptions, where we are referred to the objects producing them, if these cannot be come at, as is sometimes the case, the names by which they are expressed must remain empty sounds. But new ideas of this class occurring very rarely in the sciences, they seldom create any great obstruction. It is otherwise with our complex notions; for every step we take leading us into new combinations and views of things, it becomes necessary to explain these to others, before they can be made acquainted with our discoveries: and as the manner of definitions is easy, requiring no apparatus but that of words, which are always ready, and at hand; hence we can with less difficulty remove such obstacles as might arise from terms of our own invention, when they are made to stand for new complex ideas suggested to the mind by some present train of thinking. And thus at last we are let into the mystery hinted at in the beginning of this chapter, viz. how we may become acquainted with the thoughts of another, when he makes use of words to which we have as yet joined no ideas. The answer is obvious from what has been already said. If the terms denote simple perceptions, he must refer us to these objects of nature whence the perceptions themselves are to be obtained; but, if they stand for complex ideas, their meaning may be explained by a *definition*.

Chap. II. *Of Definition.*

8 Definition defined.

I. A definition *is the unfolding of some conception of the mind, answering to the word or term made use of as the sign of it.* Now as, in exhibiting any idea to another, it is necessary that the description be such as may excite that precise idea in his mind; hence it is plain that definitions, properly speaking, are not arbitrary, but confined to the representing of certain determinate settled notions, such namely as are annexed by the speaker or writer to the words he uses. As nevertheless it is universally allowed that the signification of words is perfectly voluntary, and not the effect of any natural and necessary connection between them and the ideas for which they stand; some may perhaps wonder why definitions are not so too. In order therefore to unravel this difficulty, and show distinctly what is and what is not arbitrary in speech, we must carefully distinguish between the connection of our words and ideas, and the unfolding of the ideas themselves.

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9 The connexion between words and ideas, a perfectly voluntary establishment.

II. First, as to the connexion of our words and ideas; this, it is plain, is a purely arbitrary institution. When, for instance, we have in our minds the idea of any particular species of metals, the calling it by the name *gold* is an effect of the voluntary choice of men speaking the same language, and not of any peculiar aptness in that sound to express that idea. Other nations we find make use of different sounds, and with the same effect. Thus *aurum* denotes that idea in Latin, and *or* in French; and even the word *gold* itself would have as well served to express the idea of that metal which we call *silver*, had custom in the beginning established it.

10 The description of ideas not so, but bounded to the representation of that precise appearance by which they are distinguished among themselves.

III. But although we are thus entirely at liberty in connecting any idea with any sound, yet it is quite otherwise in unfolding the ideas themselves. For every idea having a precise appearance of its own, by which it is distinguished from every other idea; it is manifest, that in laying it open to others, we must study such a description as shall exhibit that peculiar appearance. When we have formed to ourselves the idea of a figure bounded by four equal sides, joined together at right angles, we are at liberty to express that idea by any sound, and call it either a *square* or a *triangle*. But whichever of these names we use, so long as the idea is the same, the description by which we would signify it to another must be so too. Let it be called *square* or *triangle*, it is still a figure having four equal sides, and all its angles right ones. Hence we clearly see what is and what is not arbitrary in the use of words. The establishing any sound as the mark of some determinate idea in the mind, is the effect of free choice, and a voluntary combination among men: and as different nations make use of different sounds to denote the same ideas, hence proceed all that variety of languages which we meet with in the world. But when a connexion between our ideas and words is once settled, the unfolding of the idea answering to any word, which properly constitutes a definition, is by no means an arbitrary thing: for here we are bound to exhibit that precise conception which either the use of language, or our own particular choice, hath annexed to the term we use.

11 Cause of the obscurity that has hitherto perplexed the theory of definitions.

IV. And thus it appears, that definitions, considered as descriptions of ideas in the mind, are steady and invariable, being bounded to the representation of these precise ideas. But then, in the application of definitions to particular names, we are altogether left to our own free choice. Because as the connecting of any idea with any sound is a perfectly arbitrary institution, the applying the description of that idea to that sound must be so too. When therefore logicians tell

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us that the definition of the name is arbitrary, they mean no more than this; that as different ideas may be connected with any term, according to the good pleasure of him that uses it; in like manner may different descriptions be applied to the term, suitable to the ideas so connected. But this connexion being settled, and the term considered as the sign of some fixed idea in the understanding, we are no longer left to arbitrary explications, but must study such a description as corresponds with that precise idea. Now this alone, according to what has been before laid down, ought to be accounted a definition. What seems to have occasioned no small confusion in this matter is, that many explanations of words, where no idea is unfolded, but merely the connexion between some word and idea asserted, have yet been dignified with the name of definitions. Thus, when we say that *a clock is an instrument by which we measure time*; that is by some called a definition; and yet it is plain that we are beforehand supposed to have an idea of this instrument, and only taught that the word *clock* serves in common language to denote that idea. By this rule all explications of words in our dictionaries will be definitions, nay, the names of even simple ideas may be thus defined. *White*, we may say, is the colour we observe in snow or milk; *heat* the sensation produced by approaching the fire; and so in innumerable other instances. But these, and all others of the like kind, are by no means definitions, exciting new ideas in the understanding, but merely contrivances to remind us of known ideas, and teach their connexion with the established names.

12 Complex ideas alone capable of that kind of description which goes by the name of a definition.

V. But now in definitions properly so called, we first consider the term we use, as the sign of some inward conception, either annexed to it by custom, or our own free choice: and then the business of the definition is to unfold and explicate that idea. As therefore the whole art lies in giving just and true copies of our ideas; a definition is then said to be made perfect, when it serves distinctly to excite the idea described in the mind of another, even supposing him before wholly unacquainted with it. This point settled, let us next inquire what those ideas are which are capable of being thus unfolded? and in the first place it is evident, that all our simple ideas are necessarily excluded. We have seen already that experience alone is to be consulted here, insomuch that if either the objects whence they are derived come not in our way, or the avenues appointed by nature for their reception are wanting, no description is sufficient to convey them into the mind. But where the understanding is already supplied with these original and primitive conceptions, as they may be united together in an infinity of different forms; so may all their several combinations be distinctly laid open, by enumerating the simple ideas concerned in the various collections, and tracing the order and manner in which they are linked one to another. Now these combinations of simple notices constitute what we call our complex notions, whence it is evident, that complex ideas, and those alone, admit of that kind of description which goes by the name of a definition.

VI. Definitions, then, are pictures or representations of our ideas; and as these representations are then only possible when the ideas themselves are complex, it is obvious to remark, that definitions cannot have place, but where we make use of terms standing for such complex ideas. But our complex ideas being, as we have said, nothing more than different combinations of simple ideas; we then know and comprehend them perfectly, when we know the several simple ideas of which they consist, and can so put them together in our minds as may be necessary towards the framing of that peculiar connexion which gives every idea its distinct and proper appearance.

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13 Two things required in a definition, to enumerate the ideas and explain the manner of their combinations.

VII. Two things are therefore required in every definition: first, That all the original ideas, out of which the complex one is formed, be distinctly enumerated; and, secondly, That the order and manner of combining them into one conception be clearly explained. Where a definition has these requisites, nothing is wanting to its perfection; because every one who reads it and understands the terms, seeing at once what ideas he is to join together, and also in what manner, can at pleasure form in his own mind the complex conception answering to the term defined. Let us, for instance, suppose the word *square* to stand for that idea by which we represent to ourselves a figure whose sides subtend quadrants of a circumscribed circle. The parts of this idea are the sides bounding the figure. These must be four in number, and all equal among themselves, because they are each to subtend a fourth part of the same circle. But, besides these component parts, we must also take notice of the manner of putting them together, if we would exhibit the precise idea for which the word *square* here stands. For four equal right lines, anyhow joined, will not subtend quadrants of a circumscribed circle. A figure with this property must have its sides standing also at right angles. Taking in therefore this last consideration respecting the manner of combining the parts, the idea is fully described, and the definition thereby rendered complete. For a figure bounded by four equal sides, joined together at right angles, has the property required; and is moreover the only right-lined figure to which that property belongs.

14 How we are to proceed to arrive at just and adequate definitions.

VIII. It will now be obvious to every one, in what manner we ought to proceed, in order to arrive at just and adequate definitions. First, We are to take an exact view of the idea to be described, trace it to its original principles, and mark the several simple perceptions that enter into the composition of it. Secondly, We are to consider the particular manner in which these elementary ideas are combined, in order to the forming of that precise conception for which the term we make use of stands. When this is done, and the idea wholly unravelled, we have nothing more to do than fairly transcribe the appearance it makes to our own minds. Such a description, by distinctly exhibiting the order and number of our primitive conceptions, cannot fail to excite at the same time in the mind of every one that reads it, the complex idea resulting from them; and therefore attains the true and proper end of a definition.

CHAP. III. *Of the Composition and Resolutions of our Ideas, and the Rules of Definition thence arising.*

I. THE rule laid down in the foregoing chapter is general, extending to all possible cases; and is indeed that

that to which alone we can have recourse, where any doubt or difficulty arises. It is not, however, necessary that we should practise it in every particular instance. Many of our ideas are extremely complicated, insomuch that to enumerate all the simple perceptions out of which they are formed, would be a very troublesome and tedious work. For this reason logicians have established certain compendious rules of defining, of which it may not be amiss here to give some account. But in order to the better understanding of what follows, it will be necessary to observe, that there is a certain gradation in the composition of our ideas. The mind of man is very limited in its views, and cannot take in a great number of objects at once. We are therefore fain to proceed by steps, and make our first advances subservient to those which follow. Thus, in forming our complex notions, we begin at first with but a few simple ideas, such as we can manage with ease, and unite them together into one conception. When we are provided with a sufficient stock of these, and have by habit and use rendered them familiar to our minds, they become the component parts of other ideas still more complicated, and form what we may call a second order of compound notions. This process, as is evident, may be continued to any degree of composition we please, mounting from one stage to another, and enlarging the number of combinations.

15 In compounding our ideas, we proceed by a successive gradation.

16 Hence ideas of this class best comprehended, when we advance gradually through all the several orders.

II. But now in a series of this kind, whoever would acquaint himself perfectly with the last and highest order of ideas, finds it much the most expedient method to proceed gradually through all the intermediate steps. For, were he to take any very compound idea to pieces, and, without regard to the several classes of simple perceptions that have already been formed into distinct combinations, break it at once into its original principles, the number would be so great as perfectly to confound the imagination, and overcome the utmost reach and capacity of the mind. When we see a prodigious multitude of men jumbled together in crowds, without order or any regular position, we find it impossible to arrive at an exact knowledge of their number. But if they are formed into separate battalions, and so stationed as to fall within the leisure survey of the eye; by viewing them successively and in order, we come to an easy and certain determination. It is the same in our complex ideas. When the original perceptions, out of which they are framed, are very numerous, it is not enough that we take a view of them in loose and scattered bodies; we must form them into distinct classes, and unite these classes in a just and orderly manner, before we can arrive at a true knowledge of the compound notices resulting from them.

17 Our definitions should keep pace with our ideas, and observe a like gradation.

III. This gradual progress of the mind to its compound notions, through a variety of intermediate steps, plainly points out the manner of conducting the definitions by which these notions are conveyed into the minds of others. For as the series begins with simple and easy combinations, and advances through a succession of different orders, rising one above another in the degree of composition, it is evident, that, in a train of definitions expressing these ideas, a like gradation is to be observed. Thus the complex ideas of the lowest order can no otherwise be described than by enumerating the simple ideas out of which they are made, and explaining the manner of their union. But then in the second, or any other succeeding order, as they are formed out of those gradual combinations, and constitute the inferior classes, it is not necessary, in describing them, to mention one by one all the simple ideas of which they consist. They may be more distinctly and briefly unfolded, by enumerating the compound ideas of a lower order, from whose union they result, and which are all supposed to be already known in consequence of previous definitions. Here then it is that the logical method of defining takes place; which, that it may be the better understood, we shall explain somewhat more particularly the several steps and gradations of the mind in compounding its ideas, and thence deduce that peculiar form of a definition which logicians have thought fit to establish.

18 The steps by which the mind proceeds from particular to general ideas.

IV. All the ideas we receive from the several objects of nature that surround us, represent distinct individuals. These individuals, when compared together, are found in certain particulars to resemble each other. Hence, by collecting the resembling particulars into one conception, we form the notion of a *species*. And here let it be observed, that this last idea is less complicated than that by which we represent any of the particular objects contained under it. For the idea of the species excludes the peculiarities of the several individuals, and retains only such properties as are common to them all. Again, By comparing several species together, and observing their resemblance, we form the idea of a *genus*; where, in the same manner as before, the composition is lessened, because we leave out what is peculiar to the several species compared, and retain only the particulars wherein they agree. It is easy to conceive the mind proceeding thus from one step to another, and advancing through its several classes or general notions, until at last it comes to the highest genus of all, denoted by the word *being*, where the bare idea of existence is only concerned.

19 The conduct of the mind in compounding its ideas, as it advances through the different order of perception.

V. In this procedure we see the mind unravelling a complex idea, and tracing it in the ascending scale, from greater or less degrees of composition, until it terminates in one simple perception. If now we take the series the contrary way, and, beginning with the last or highest genus, carry our view downwards, through all the inferior genera and species, quite to the individuals, we shall thereby arrive at a distinct apprehension of the conduct of the understanding in compounding its ideas. For, in the several classes of our perceptions, the highest in the scale is for the most part made up of but a few simple ideas, such as the mind can take in and survey with ease. This first general notion, when branched out into the different subdivisions contained under it, has in every one of them something peculiar, by which they are distinguished among themselves; insomuch that, in descending from the genus to the species, we always superadd some new idea, and thereby increase the degree of composition. Thus the idea denoted by the word *figure* is of a very general nature, and composed of but few simple perceptions, as implying no more than space everywhere bounded. But if we descend farther, and consider the boundaries of this space, as that they may be either lines or surface, we

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fall into the several species of figure. For where the space is bounded by one or more surfaces, we give it the name of a *solid figure;* but where the boundaries are lines, it is called a *plain figure* (A)

20 The idea of the species found by superadding the specific difference to the genus.

VI. In this view of things it is evident, that the species is formed by superadding a new idea to the genus. Here, for instance, the genus is circumscribed space. If now to this we superadd the idea of a circumscription by lines, we frame the notion of that species of figures which are called *plain;* but if we conceive the circumscription to be by surfaces, we have the species of solid figures. This superadded idea is called the *specific difference*, not only as it serves to divide the species from the genus, but because, being different in all the several subdivisions, we thereby also distinguish the species one from another. And as it is likewise that conception, which, by being joined to the general idea, completes the notion of the species: hence it is plain, that the genus and specific difference are to be considered as the proper and constituent parts of the species. If we trace the progress of the mind still farther, and observe it advancing through

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(A) This account of the composition and resolution of our ideas is agreeable to the common doctrine of logicians on the subject. Into the truth of the doctrine itself we shall inquire afterwards under the article METAPHYSICS: but to prevent mistakes, it may be proper to observe here, that though every writer of logic has treated largely of *general* and *specific ideas*, there is in reality nothing *general* in the matter but the *terms of language*. When we utter, for instance, the word *triangle*, that *general term* does not, as has been often said, suggest to the mind the *general idea* of a triangle, which is neither *oblique* nor *rectangle*, neither *equilateral* nor *scalenon*, &c. for *such* a triangle, as it cannot *exist* in *nature*, cannot be *conceived* in *idea*. In like manner, the *general term Virtue* does not excite a general *idea* of *virtue*, which is neither *prudence*, nor *temperance*, nor *fortitude*, nor *justice*, nor *charity*, &c. for that which is *distinct* from *all these* is not *virtue*. What then is the import of such *general terms?* The answer is obvious: they denote *classes of objects;* and are never used without some word of limitation, but when something has no dependence upon the *particular qualities*, which distinguish the individuals from each other, is affirmed or denied of the whole class. Thus we may affirm, that the *three angles of a plain triangle are equal to two right angles:* and this proportion is demonstrably true, *not* of a triangle, which is neither *oblique* nor *rectangle*, neither *equilateral* nor *scalenon*, for such a triangle never was conceived; but of *all these* triangles equally, as the truth of the proposition and the progress of the demonstration has no dependence upon the *peculiarities* which *distinguish* these triangles from one another. Again, When we say that *a man of virtue will be rewarded by God*, we do not mean by the word *virtue* a *general idea* making part of each of the complex and more *particular* ideas of *prudence, fortitude, justice*, &c. and at the same time *different* from them all; but we affirm, that the man who practises *any* or *all* of these virtues, according as he has opportunity, will be rewarded by God.

The history of our ideas is shortly thus:—That act of the mind, if it may be called an *act*, which makes known an *external object*, is termed PERCEPTION. That act of the mind which makes known an *internal object*, is termed CONSCIOUSNESS. Objects once perceived may be recalled to the mind by the power of *memory;* and when they are so recalled, we have a perception of them in all respects similar to the original perception, only less distinct; we fancy *ourselves* in the *same place*, and the *object perceived* attended by the *same circumstances*. This indistinct *secondary perception* of an object is termed an IDEA; and therefore the precise and accurate definition of an *idea*, in contradistinction to an *original perception*, is "that perception of a real object which is raised in the mind by the power of memory." Now all our *original perceptions* being of *particular objects*, it is obvious that our *ideas*, which are only those perceptions recalled, must be of *particular objects likewise*, and that no man can have an *idea* of a thing of which the *real existence* is contradictory and impossible. But the *general* and *specific ideas* of logicians, are ideas of *nothing which exist*, or *which can possibly exist*. They are acquired, we are told, by *abstraction*, in the following manner. Among a number of individuals we perceive certain qualities the same in all, whilst in each individual there are other qualities which have nothing similar to them in any other individual: now the mind, it is said, has a power of abstracting the *particular qualities* of *each individual* from *those* which are *common to the whole*, and of these last forming a *general idea* of the whole class. Thus all men have nearly the *same form;* and they have each *some stature* and *some colour*, though there are not perhaps two individuals who have *precisely the same stature* and the *same colour*. Now, say the advocates for general ideas, if we *abstract* what is *peculiar* to *each individual*, and retain what is *common* to the *whole race*, we have the *general idea* signified by the word *man*. That is, if we conceive a being in human shape, which is of *stature* and *colour*, but neither *tall* nor *short*, neither *white* nor *black*, nor *red* nor *brown*, nor *any other colour which we ever saw*, we have the *general idea* of *humanity*, and understand the meaning of the *word man!* Surely no person who is not the slave of prejudice will pretend that he can frame such an idea as this—the idea of an object which cannot possibly exist in nature.

By this we do not mean to affirm, that we cannot frame ideas of such objects as have *no real* existence; for it is as easy to imagine a man with *ten heads* as *with one*, because there is nothing contradictory between *ten heads* and *one body*. But *figure*, which is said to be space bounded *neither by lines nor superficies; colour*, which is neither *red* nor *white*, nor *blue* nor *black*, &c.; and *animal*, which is neither *man, beast, bird*, nor *insect;* are impossible in nature, and inconceivable in idea. There is, however, no harm in still retaining the phrase *general idea*, provided he who uses it takes care to let it be known, that by these words he means not *any abstract* and *contradictory idea*, but merely a *class* of *real objects*. The phrase may at times prevent much circumlocution; for which reason we have retained the use of it in the text.

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through the inferior species, we shall find its manner of proceeding to be always the same. For every lower species is formed by superadding some new idea to the species next above it; insomuch that in this descending scale of our perceptions, the understanding passes through different orders of complex notions, which become more and more complicated at every step it takes. Let us resume here, for instance, the species of plain figures. They imply no more than space bounded by lines. But if we take in an additional consideration of the nature of these lines, as whether they are *right* or *curves*, we fall into the subdivisions of plain figure, distinguished by the names of *rectilinear*, *curvilinear*, and *mixtilinear*.

21 And in all the inferior species by superadding the specific difference to the nearest genus.

VII. And here we are to observe, that though plain figures, when considered as one of those branches that come under the notions of figure in general, take the name of a species; yet compared with the classes of curvilinear, rectilinear, and mixtilinear, into which they themselves may be divided, they really become a genus, of which the before-mentioned subdivisions constitute the several species. These species, in the same manner as in the case of plane and solid figures, consist of the genus and specific difference as their constituent parts. For in the curvilinear kind, the curvity of the lines bounding the figure makes what is called the *specific difference;* to which if we join the genus, which here is a plain figure or space circumscribed by lines, we have all that is necessary towards completing the notion of this species. We are only to take notice, that this last subdivision, having two genera above it, viz, plain figure, and figure in general; the genus joined with the specific difference, in order to constitute the species of curvilinears, is that which lies nearest to the said species. It is the notion of plain figure, and not of figure in general, that, joined with the idea of curvity, makes up the complex conception of curve-lined figures. For in this descending scale of our ideas, figure in general, plain figures, curve-lined figures, the two first are considered as genera in respect of the third; and the second in order, or that which stands next to the third, is called the *nearest genus*. But now as it is this second idea, which, joined with the notion of curvity, forms the species of curve-lined figures; it is plain, that the third or last idea in the series is made up of the nearest genus and specific difference. This rule holds invariably, however far the series is continued; because, in a train of ideas thus succeeding one another, all that precede the last are considered as so many genera in respect of that last; and the last itself is always formed by superadding the specific difference to the genus next it.

22 The idea of any individual composed of the lowest species and numeric difference.

VIII. Here then we have an universal description, applicable to all our ideas of whatever kind, from the highest genus to the lowest species. For, taking them in order downwards from the said general idea, they everywhere consist of the *genus proximum* and *differentia specifica*, as logicians love to express themselves. But when we come to the lowest species of all, comprehending under it only individuals, the superadded idea, by which these individuals are distinguished one from another, no longer takes the name of the specific difference. For here it serves not to denote distinct species, but merely a variety of individuals, each of which, having a particular existence of its own, is therefore numerically different from every other of the same kind. And hence it is, that in this last case, logicians choose to call the superadded idea by the name of the *numerical difference;* insomuch that, as the idea of a species is made up of the nearest genus and specific difference, so the idea of an individual consists of the lowest species and numeric difference. Thus the circle is a species of curve-lined figures, and what we call the *lowest species*, as comprehending under it only individuals. Circles in particular are distinguished from one another by the length and position of their diameters. The length therefore and position of the diameter of a circle form what logicians call the *numerical difference;* because, these being given, the circle itself may be described, and an individual thereby constituted.

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23 Definitions to follow one another in train, and pass through the same successive gradations as our compound ideas.

IX. Thus the mind, in compounding its ideas, begins, we see, with the most general notions, which, consisting of but a few simple notices, are easily combined and brought together into one conception. Thence it proceeds to the species comprehended under this general idea; and these are formed by joining together the genus and specific difference. And as it often happens, that these species may be still farther subdivided, and run on in a long series of continued gradations, producing various orders of compound perceptions; so all these several orders are regularly and successively formed by annexing in every step the specific difference to the nearest genus. When by this method of procedure we are come to the lowest order of all, by joining the species and numeric difference, we frame the ideas of individuals. And here the series necessarily terminates, because it is impossible any farther to bound or limit our conceptions. This view of the composition of our ideas, representing their constituent parts in every step of the progression, naturally points out the true and genuine form of a definition. For as definitions are no more than descriptions of the ideas for which the terms defined stand: and as ideas are then described, when we enumerate distinctly and in order the parts of which they consist; it is plain, that by making our definitions follow one another according to the natural train of our conceptions, they will be subject to the same rules, and keep pace with the ideas they describe.

24 The form of a definition in all the various orders of conception.

X. As therefore the first order of our compound notions, or the ideas that constitute the highest genera in the different scales of perception, are formed by uniting together a certain number of simple notices; so the terms expressing these genera are defined *by enumerating the simple notices so combined*. And as the species comprehended under any genus, or the complex ideas of the second order, arise from superadding the specific difference to the said general idea; so the definition of the names of the species is absolved, in a detail of the ideas of the specific difference, connected with the term of the genus. For the genus having been before defined, the term by which it is expressed stands for a known idea, and may therefore be introduced into all subsequent definitions, in the same manner as the names of simple perceptions. It will now be sufficiently obvious, that the definitions of all the succeeding orders of compound notions will every-

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where consist of the term of the nearest genus, joined with an enumeration of the ideas that constitute the specific difference; and that the definition of individuals unites the name of the lowest species with the terms by which we express the ideas of the numeric difference.

XI. Here then we have the true and proper form of a definition, in all the various orders of conception. This is that method of defining which is commonly called *logical*, and which we see is perfect in its kind, inasmuch as it presents a full and adequate description of the idea for which the term defined stands.

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PART II. OF JUDGMENT.

CHAP. I. *Of the Grounds of Human Judgment.*

25 Intuition respects the relations between our ideas when they are immediately perceivable.

THE mind being furnished with ideas, its next step in the way to knowledge is, the comparing these ideas together, in order to judge of their agreement or disagreement. In this joint view of our ideas, if the relation is such as to be immediately discoverable by the bare inspection of the mind, the judgments thence obtained are called *intuitive*, from a word that denotes *to look at;* for in this case, a mere attention to the ideas compared suffices to let us see how far they are connected or disjointed. Thus, *that the Whole is greater than any of its Parts*, is an intuitive judgment; nothing more being required to convince us of its truth, than an attention to the ideas of *whole* and *part*. And this too is the reason why we call the act of the mind forming these judgments *intuition;* as it is indeed no more than an immediate perception of the agreement or disagreement of any two ideas.

26 Experience and testimony the ground of judging as to facts.

II. But here it is to be observed, that our knowledge of this kind respects only our ideas, and the relations between them; and therefore can serve only as a foundation to such reasonings as are employed in investigating those relations. Now it so happens, that many of our judgments are conversant about facts, and the real existence of things which cannot be traced by the bare contemplation of our ideas. It does not follow, because I have the idea of a circle in my mind, that therefore a figure answering to that idea has a real existence in nature. I can form to myself the notion of a centaur or golden mountain, but never imagine on that account that either of them exists. What then are the grounds of our judgment in relation to facts? *experience and testimony*. By experience we are informed of the existence of the several objects which surround us, and operate upon our senses. Testimony is of a wider extent, and reaches not only to objects beyond the present sphere of our observation, but also to facts and transactions, which being now past, and having no longer any existence, could not without this conveyance have fallen under our cognizance.

27 Three foundations of human judgment, viz. 1. Intuition, the ground of scientifical knowledge.

III. Here we have three foundations of human judgment, from which the whole system of our knowledge may with ease and advantage be derived. First, Intuition, which respects our ideas themselves, and their relations; and is the foundation of that species of reasoning which we call *demonstration*. For whatever is deduced from our intuitive perceptions, by a clear and connected series of proofs, is said to be demonstrated, and produces absolute certainty in the mind. Hence the knowledge obtained in this manner is what we properly term *science;* because in every step of the procedure it carries its own evidence along with it, and leaves no room for doubt or hesitation. And what is highly worthy of notice; as the truths of this class express the relations between our ideas, and the same relations must ever and invariably subsist between the same ideas, our deductions in the way of science constitute what we call *eternal*, *necessary*, and *immutable truths*. If it be true that the whole is equal to all its parts, it must be so unchangeably; because the relation of equality being attached to the ideas themselves, must ever intervene where the same ideas are compared. Of this nature are all the truths of natural religion, morality, and mathematics, and in general whatever may be gathered from the bare view and consideration of our ideas.

28 2. Experience, the ground of our knowledge of the powers and qualities of bodies.

IV. The second ground of human judgment is *experience;* from which we infer the existence of those objects that surround us, and fall under the immediate notice of our senses. When we see the sun, or cast our eyes towards a building, we not only have perceptions of these objects within ourselves, but ascribe to them a real existence out of the mind. It is also by the information of the senses that we judge of the qualities of bodies; as when we say that *snow is white*, *fire hot*, or *steel hard*. For as we are wholly unacquainted with the internal structure and constitution of the bodies that produce these sensations in us, nay, and are unable to trace any connexion between that structure and the sensations themselves, it is evident, that we build our judgments altogether upon observation, ascribing to bodies such qualities as are answerable to the perceptions they excite in us. Not that we ever suppose the qualities of bodies to be things of the same nature with our perceptions; for there is nothing in fire similar to our sensation of heat, or in a sword similar to pain: but that when different bodies excite in our minds similar perceptions, we necessarily ascribe to these bodies not only an existence independent of us, but likewise similar qualities, of which it is the nature to produce similar perceptions in the human mind. But this is not the only advantage derived from experience; for to that too we are indebted for all our knowledge regarding the co-existence of sensible qualities in objects, and the operations of bodies one upon another. Ivory, for instance, is hard and elastic: this we know by experience, and indeed by that alone. For, being altogether strangers to the true nature both of elasticity and hardness, we cannot by the bare contemplation of our ideas determine how far the one necessarily implies the other, or whether there may not be a repugnance between them. But when we observe them to exist both in the same object, we are then assured from experience that they are not incompatible; and when we also find, that a stone is hard and not elastic, and that air though elastic

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stic is not hard, we also conclude upon the same foundation, that the ideas are not necessarily conjoined, but may exist separately in different objects. In like manner, with regard to the operations of bodies one upon another, it is evident, that our knowledge this way is all derived from observation. *Aqua regia* dissolves gold, as has been found by frequent trial, nor is there any other way of arriving at the discovery. Naturalists may tell us, if they please, that the parts of *aqua regia* are of a texture apt to insinuate between the corpuscles of gold, and thereby loosen and shake them asunder. If this is a true account of the matter, it will notwithstanding be allowed, that our conjecture in regard to the conformation of these bodies is deduced from the experiment, and not the experiment from the conjecture. It was not from any previous knowledge of the intimate structure of *aqua regia* and *gold*, and the aptness of their parts to act or to be acted upon, that we came by the conclusion above mentioned. The internal constitution of bodies is in a manner wholly unknown to us: and could we even surmount this difficulty, yet as the separation of the parts of gold implies something like an active force in the *menstruum*, and we are unable to conceive how it comes to be possessed of this activity, the effect must be owned to be altogether beyond our comprehension. But when repeated trials had once confirmed it, insomuch that it was admitted as an established truth in natural knowledge, it was then easy for men to spin out theories of their own invention, and contrive such a structure of parts, both for *gold* and *aqua regia*, as would best serve to explain the phenomenon upon the principles of that system of philosophy they had adopted.

V. From what has been said it is evident, that as intuition is the foundation of what we call *scientifical* knowledge, so is experience of *natural*. For this last being wholly taken up with objects of sense, or those bodies that constitute the natural world; and their properties, as far as we can discover them, being to be traced only by a long and painful series of observations; it is apparent, that, in order to improve this branch of knowledge, we must betake ourselves to the method of trial and experiment.

VI. But though experience is what we may term the immediate foundation of natural knowledge, yet with respect to particular persons its influence is very narrow and confined. The bodies that surround us are numerous, many of them lie at a great distance, and some quite beyond our reach. Life is so short, and so crowded with cares, that but little time is left for any single man to employ himself in unfolding the mysteries of nature. Hence it is necessary to admit many things upon the testimony of others, which by this means becomes the foundation of a great part of our knowledge of body. No man doubts of the power of *aqua regia* to dissolve gold, though perhaps he never himself made the experiment. In these therefore and such like cases we judge of the facts and operations of nature upon the mere ground of testimony. However, as we can always have recourse to experience where any doubt or scruple arises, this is justly considered as the true foundation of natural philosophy; being indeed the ultimate support upon which our assent rests, and whereto we appeal when the highest degree of evidence is required.

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VII. But there are many facts that will not allow of an appeal to the senses; and in this case testimony is the true and only foundation of our judgments. All human actions of whatever kind, when considered as already past, are of the nature here described; because having now no longer any existence, both the facts themselves, and the circumstances attending them, can be known only from the relations of such as had sufficient opportunities of arriving at the truth. *Testimony* therefore is justly accounted a third ground of human judgment; and as from the other two we have deduced *scientifical* and *natural* knowledge, so we may from this derive *historical;* by which we mean, not merely a knowledge of the civil transactions of states and kingdoms, but of all facts whatsoever, where testimony is the ultimate foundation of our belief.

29 3. Testimony, the ground of historical knowledge.

Chap. II. *Of Affirmative and Negative Propositions.*

30 The subject and predicate of a proposition explained

I. While the comparing of our ideas is considered merely as an act of the mind, assembling them together, and joining or disjoining them according to the result of its perceptions, we call it *judgment;* but when our judgments are put into words, they then bear the name of *propositions*. A proposition therefore is a sentence expressing some judgment of the mind, whereby two or more ideas are affirmed to agree or disagree. Now, as our judgments include at least two ideas, one of which is affirmed or denied of the other, so must a proposition have terms answering to these ideas. The idea of which we affirm or deny, and of course the term expressing that idea, is called the *subject* of the proposition. The idea affirmed or denied, as also the term answering it, is called the *predicate*. Thus in the proposition, *God is omnipotent: God* is the subject, it being of him that we affirm omnipotence; and *omnipotent* is the predicate, because we affirm the idea expressed by that word to belong to God.

31 The copula, &c.

II. But as, in propositions, ideas are either joined or disjoined; it is not enough to have terms expressing those ideas, unless we have also some words to denote their agreement or disagreement. That word in a proposition, which connects two ideas together, is called the *copula;* and if a negative particle be annexed, we thereby understand that the ideas are disjoined. The *substantive verb* is commonly made use of for the copula: as in the above mentioned proposition, *God is omnipotent;* where *is* represents the copula, and signifies the agreement of the ideas of *God* and *omnipotence*. But if we mean to separate two ideas; then, besides the substantive verb, we must also use some particle of negation, to express this repugnance. The proposition, *man is not perfect*, may serve as an example of this kind; where the notion of *perfection* being removed from the idea of *man*, the negative particle *not* is inserted after the copula, to signify the disagreement between the subject and predicate.

32 Propositions sometimes expressed by a single word.

III. Every proposition necessarily consists of these three parts; but then it is not alike needful that they be all severally expressed in words; because the copula is often included in the term of the predicate, as when we

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we say, *he sits;* which imports the same as *he is sitting.* In the Latin language, a single word has often the force of a whole sentence. Thus *ambulat* is the same as *ille est ambulans; amo*, as *ego sum amans;* and so in innumerable other instances: by which it appears, that we are not so much to regard the number of words in a sentence, as the ideas they represent, and the manner in which they are put together. For wherever two ideas are joined or disjoined in an expression, though of but a single word; it is evident that we have a subject, predicate, and copula, and of consequence a complete proposition.

33 Affirmative and negative propositions.

IV. When the mind joins two ideas, we call it an *affirmative* judgment; when it separates them, *a negative;* and as any two ideas compared together must necessarily either agree or not agree, it is evident that all our judgments fall under these two divisions. Hence likewise the propositions expressing these judgments are all either affirmative or negative. An affirmative proposition connects the predicate with the subject, as *a stone is heavy;* a negative proposition separates them, as *God is not the author of evil. Affirmation* therefore is the same as joining two ideas together; and this is done by means of the copula. *Negation*, on the contrary, marks the repugnance between the ideas compared; in which case a negative particle must be called in, to show that the connexion included in the copula does not take place.

34 When the negative particle serves to disjoin ideas.

V. Hence we see the reason of the rule commonly laid down by logicians, That in all negative propositions the negation ought to affect the copula. For as the copula, when placed by itself, between the subject and the predicate, manifestly binds them together; it is evident, that in order to render a proposition negative, the particles of negation must enter it in such a manner as to destroy this union. In a word, then only are two ideas disjoined in a proposition, when the negative particle may be so referred to the copula, as to break the affirmation included in it, and undo that connexion it would otherwise establish. When we say, for instance, *No man is perfect;* take away the negation and the copula of itself plainly unites the ideas in the proposition. But as this is the very reverse of what is intended, a negative mark is added, to show that this union does not here take place. The negation, therefore, by destroying the effect of the copula, changes the very nature of the proposition, insomuch that, instead of binding two ideas together, it denotes their separation. On the contrary, in this sentence, *The man who departs not from an upright behaviour is beloved of God*, the predicate *beloved of God* is evidently affirmed of the subject an *upright man;* so that, notwithstanding the negative particle, the proposition is still affirmative. The reason is plain: the negation here affects not the copula; but, making properly a part of the subject, serves, with other terms in the sentence, to form one complex idea, of which the predicate *beloved of God* is directly affirmed.

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Chap. III. *Of Universal and Particular Propositions.*

35 Division of propositions into universal and particular.

I. The next considerable division of propositions is into *universal* and *particular*. Our ideas, according to what has been already observed in the First Part, are all singular as they enter the mind, and represent individual objects. But as by abstraction we can render them universal, so as to comprehend a whole class of things, and sometimes several classes at once; hence the terms expressing these ideas must be in like manner universal. If, therefore, we suppose any general term to become the subject of a proposition, it is evident, that whatever is affirmed of the abstract idea belonging to that term, may be affirmed of all the individuals to which that idea extends. Thus, when we say, *Men are mortal;* we consider mortality, not as confined to one or any number of particular men, but as what may be affirmed without restriction of the whole species. By this means the proposition becomes as general as the idea which makes the subject of it; and indeed derives its universality entirely from that idea, being more or less so according as this may be extended to more or fewer individuals. But it is further to be observed of these general terms, that they sometimes enter a proposition in their full latitude, as in the example given above; and sometimes appear with a mark of limitation. In this last case we are given to understand, that the predicate agrees not to the whole universal idea, but only to a part of it; as in the proposition, *Some men are wise:* For here wisdom is not affirmed of every particular man, but restrained to a few of the human species (B).

36 Propositions universal where the subject is so, without a mark of restriction.

II. Now from this different appearance of the general idea that constitutes the subject of any judgement, arises the division of propositions into *universal* and *particular*. An universal proposition is that wherein the subject is some general term taken in its full latitude; insomuch that the predicate agrees to all the individuals comprehended under it, if it denotes a proper species; and to all the several species, and their individuals, if it marks an idea of a higher order. The words *all*, *every*, *no*, *none*, &c. are the proper signs of this universality; and as they seldom fail to accompany general truths, so they are the most obvious criterion whereby to distinguish them. *All animals have a power of beginning motion.* This is an universal proposition; as we know from the word *all* prefixed to the subject *animals*, which denotes that it must be taken in its full extent. Hence the power of beginning motion may be affirmed of all the several species of animals.

37 Propositions particular where some universal subject appears with a mark of limitation.

III. A *particular* proposition has in like manner some general term for its subject; but with a mark of limitation

(B) See the preceding note, where it is demonstrated that the *terms* alone, and not the *ideas*, are in reality *general*. The term *man* is equally applicable to every individual of the human race; and therefore, what is affirmed or denied of *men* in general, is affirmed or denied of all the individuals, without regard to their discriminating qualities. *Some* is a definitive word (see Grammar), which, prefixed to the word *man*, limits the signification of that *general term;* and therefore what is affirmed of *some men*, is affirmed only of *part* of the race, but that part itself is not ascertained.

limitation added, to denote, that the predicate agrees only to some of the individuals comprehended under a species, or to one or more of the species belonging to any genus, and not to the whole universal idea. Thus, *Some stones are heavier than iron; Some men have an uncommon share of prudence.* In the last of these propositions, the subject *some men* implies only a certain number of individuals, comprehended under a single species. In the former, where the subject is a genus that extends to a great variety of distinct classes, *some stones* may not only imply any number of particular stones, but also several whole species of stones, inasmuch as there may be not a few with the property there described. Hence we see, that a proposition does not cease to be particular by the predicate's agreeing to a whole species, unless that species, singly and distinctly considered, makes also the subject of which we affirm or deny.

38 Singular propositions contained under the head of particulars.

IV. There is still one species of propositions that remains to be described, and which the more deserves our notice, as it is not yet agreed among logicians to which of the two classes mentioned above they ought to be referred; namely, *singular* propositions, or those where the subject is an individual. Of this nature are the following: *Sir Isaac Newton was the inventor of fluxions; This book contains many useful truths.* What occasions some difficulty as to the proper rank of these propositions is, that, the subject being taken according to the whole of its extension, they sometimes have the same effect in reasoning as universals. But if it be considered that they are in truth the most limited kind of particular propositions, and that no proposition can with any propriety be called universal but where the subject is some universal idea; we shall not be long in determining to which class they ought to be referred. When we say, *Some books contain useful truths;* the proposition is particular, because the general term appears with a mark of restriction. If therefore we say, *This book contains useful truths;* it is evident that the proposition must be still more particular, as the limitation implied in the word *this*, is of a more confined nature than in the former case.

39 The fourfold division of propositions.

V. We see, therefore, that all propositions are either *affirmative* or *negative;* nor is it less evident, that in both cases they may be *universal* or *particular*. Hence arises that celebrated fourfold division of them into *universal affirmative* and *universal negative*, *particular affirmative* and *particular negative*, which comprehends indeed all their varieties. The use of this method of distinguishing them will appear more fully afterwards, when we come to treat of reasoning and syllogism.

Chap. IV. *Of Absolute and Conditional Propositions.*

40 Distinction of qualities into essential and accidental.

I. The objects about which we are chiefly conversant in this world, are all of a nature liable to change. What may be affirmed of them at one time, cannot often at another; and it makes no small part of our knowledge to distinguish rightly these variations, and trace the reasons upon which they depend. For it is observable, that amidst all the vicissitudes of nature, some things remain constant and invariable; nor even are the changes, to which we see others liable, effected but in consequence of uniform and steady laws, which, when known, are sufficient to direct us in our judgments about them. Hence philosophers, in distinguishing the objects of our perception into various classes, have been very careful to note, that some properties belong essentially to the general idea, so as not to be separable from it but by destroying its very nature; while others are only accidental, and may be affirmed or denied of it in different circumstances. Thus solidity, a yellow colour, and great weight, are considered as essential qualities of gold: but whether it shall exist as an uniform conjoined mass, is not alike necessary. We see that by a proper menstruum it may be reduced to a fine powder, and that an intense heat will bring it into a state of fusion.

41 Hence a considerable diversity in our manner of judging.

II. From this diversity in the several qualities of things arises a considerable difference as to the manner of our judging about them. For all such properties as are inseparable from objects when considered as belonging to any genus or species, are affirmed absolutely and without reserve of that general idea. Thus we say, *Gold is very weighty; A stone is hard; Animals have a power of self-motion.* But in the case of mutual or accidental qualities, as they depend upon some other consideration distinct from the general idea; that also must be taken into the account, in order to form an accurate judgment. Should we affirm, for instance, of some stones, that they are very susceptible of a rolling motion; the proposition, while it remains in this general form, cannot with any advantage be introduced into our reasonings. An aptness to receive that mode of motion flows from the figure of the stone; which, as it may vary infinitely, our judgment then only becomes applicable and determinate, when the particular figure, of which volubility is a consequence, is also taken into the account. Let us then bring in this other consideration, and the proposition will run as follows: *Stones of a spherical form are easily put into a rolling motion.* Here we see the condition upon which the predicate is affirmed, and therefore know in what particular cases the proposition may be applied.

42 Which gives rise to the division of propositions into absolute and conditional.

III. This consideration of propositions respecting the manner in which the predicate is affirmed of the subject gives rise to the division of them into *absolute* and *conditional*. *Absolute* propositions are those wherein we affirm some property inseparable from the idea of the subject, and which therefore belongs to it in all possible cases: as, *God is infinitely wise; Virtue tends to the ultimate happiness of man.* But where the predicate is not necessarily connected with the idea of the subject, unless upon some consideration distinct from that idea, there the proposition is called *conditional*. The reason of the name is taken from the supposition annexed, which is of the nature of a condition, and may be expressed as such, thus: *If a stone is exposed to the rays of the sun, it will contract some degree of heat; If a river runs in a very declining channel, its rapidity will constantly increase.*

43 The great importance of this division, as it renders propositions determinate.

IV. There is not any thing of greater importance in philosophy than a due attention to this division of propositions. If we are careful never to affirm things absolutely but where the ideas are inseparably conjoined; and if in our other judgments we distinctly mark the conditions which determine the predicate to belong to the subject; we shall be the less liable to mistake

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mistake in applying general truths to the particular concerns of human life. It is owing to the exact observance of this rule that mathematicians have been so happy in their discoveries, and that what they demonstrate of magnitude in general may be applied with ease in all obvious occurrences.

44 And reduces them from particulars to generals

V. The truth of it is, particular propositions are then known to be true, when we can trace their connexion with universals; and it is accordingly the great business of science to find out general truths that may be applied with safety in all obvious instances. Now the great advantage arising from determining with care the conditions upon which one idea may be affirmed or denied of another is this; that thereby particular propositions really become universal, may be introduced with certainty into our reasonings, and serve as standards to conduct and regulate our judgements. To illustrate this by a familiar instance: if we say, *Some water acts very forcibly;* the proposition is particular: and as the conditions on which this forcible action depends are not mentioned, it is as yet uncertain in what cases it may be applied. Let us then supply these conditions, and the proposition will run thus: *Water conveyed in sufficient quantity along a steep descent acts very forcibly.* Here we have an universal judgment, inasmuch as the predicate *forcible action* may be ascribed to all water under the circumstances mentioned. Nor is it less evident that the proposition in this new form is of easy application; and in fact we find that men do apply it in instances where the forcible action of water is required; as in corn-mills and many other works of art.

Chap V. *Of Simple and Compound Propositions.*

45 Division of propositions into simple and compound.

I. Hitherto we have treated of propositions, where only two ideas are compared together. These are in the general called *simple;* because, having but one subject and one predicate, they are the effect of a simple judgment that admits of no subdivision. But if it so happens that several ideas offer themselves to our thoughts at once, whereby we are led to affirm the same thing of different objects, or different things of the same object; the propositions expressing these judgments are called *compound:* because they may be resolved into as many others as there are subjects or predicates in the whole complex determination on the mind. Thus, *God is infinitely wise and infinitely powerful.* Here there are two predicates, *infinite wisdom* and *infinite power*, both affirmed of the same subject; and accordingly the proposition may be resolved into two others; affirming these predicates severally. In like manner in the proposition, *Neither kings nor people are exempt from death;* the predicate is denied of both subjects, and may therefore be separated from them in distinct propositions. Nor is it less evident, that if a complex judgment consists of several subjects and predicates, it may be resolved into as many simple propositions as are the number of different ideas compared together. *Riches and honours are apt to elate the mind, and increase the number of our desires.* In this judgement there are two subjects and two predicates, and it is at the same time apparent that it may be resolved into four distinct propositions. *Riches are apt to elate the mind. Riches are apt to increase the number of our desires.* And so of honours.

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46 The proper notion of a compound proposition ascertained.

II. Logicians have divided these compound propositions into a great many different classes; but, in our opinion, not with a due regard to their proper definition. Thus, *conditionals*, *causals*, *relatives*, &c. are mentioned as so many distinct species of this kind, though in fact they are no more than simple propositions. To give an instance of a conditional; *If a stone is exposed to the rays of the sun, it will contract some degree of heat.* Here we have but one subject and one predicate; for the complex expression, *A stone exposed to the rays of the sun*, constitutes the proper subject of this proposition, and is no more than one determined idea. The same thing happens in causals. *Rehoboam was unhappy because he followed evil counsel.* There is here an appearance of two propositions arising from the complexity of the expression; but when we come to consider the matter more nearly, it is evident that we have but a single subject and predicate. *The pursuit of evil counsel brought misery upon Rehoboam.* It is not enough, therefore, to render a proposition compound, that the subject and predicate are complex notions, requiring sometimes a whole sentence to express them: for in this case the comparison is still confined to two ideas, and constitute what we call a simple judgment. But where there are several subjects or predicates, or both, as the affirmation or negation may be alike extended to them all, the proposition expressing such a judgment is truly a collection of as many simple ones as there are different ideas compared. Confining ourselves, therefore, to this more strict and just notion of compound propositions, they are all reducible to two kinds. viz. *copulatives* and *disjunctives.*

47 Compound propositions, either copulative,

III. A *copulative* proposition is, where the subjects and predicates are so linked together, that they may be all severally affirmed or denied one of another. Of this nature are the examples of compound propositions given above. *Riches and honours are apt to elate the mind, and increase the numbers of our desires. Neither kings nor people are exempt from death.* In the first of these the two predicates may be affirmed severally of each subject, whence we have four distinct propositions. The other furnishes an example of the negative kind, where the same predicate, being disjoined from both subjects, may be also denied of them in separate propositions.

48 or disjunctive.

IV. The other species of compound propositions are those called disjunctives; in which, comparing several predicates with the same subject, we affirm that one of them necessarily belongs to it, but leave the particular predicate undetermined. If any one, for example, says, *This world either exists of itself, or is the work of some all-wise and powerful cause*, it is evident that one of the two predicates must belong to the world; but as the proposition determines not which, it is therefore of the kind we call *disjunctive.* Such too are the following: *The sun either moves round the earth, or is the centre about which the earth revolves. Friendship finds men equal, or makes them so.* It is the nature of all propositions of this class, supposing them to be exact in point of form, that upon determining the particular predicate, the rest are of course to be removed: or if

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all the predicates but one are removed, that one necessarily takes place. Thus, in the example given above; if we allow the world to be the work of some wise and powerful cause, we of course deny it to be self-existent; or if we deny it to be self-existent, we must necessarily admit that it was produced by some wise and powerful cause. Now this particular manner of linking the predicates together, so that the establishing one displaces all the rest; or the excluding all but one necessarily establishes that one; cannot otherwise be effected than by means of *disjunctive* particles. And hence it is that propositions of this class take their names from these particles which make so necessary a part of them, and indeed constitute their very nature considered as a distinct species.

Chap. VI. *Of the Division of Propositions into Self-evident and Demonstrable.*

49 Propositions divided into self-evident and demonstrable.

I. When any proposition is offered to the view of the mind, if the terms in which it is expressed be understood; upon comparing the ideas together, the agreement or disagreement asserted is either immediately perceived, or found to lie beyond the present reach of the understanding. In the first case the proposition is said to be *self-evident*, and admits not of any proof, because a bare attention to the ideas themselves produces full conviction and certainty; nor is it possible to call in any thing more evident by way of confirmation. But where the connexion or repugnance comes not so readily under the inspection of the mind, there we must have recourse to reasoning; and if by a clear series of proofs we can make out the truth proposed, insomuch that self-evidence shall accompany every step of the procedure, we are then able to demonstrate what we assert, and the proposition itself is said to be *demonstrable*. When we affirm, for instance, *that it is impossible for the same thing to be and not to be;* whoever understands the terms made use of perceives at first glance the truth of what is asserted, nor can he by any efforts bring himself to believe the contrary. The proposition therefore is *self-evident*, and such that it is impossible by reasoning to make it plainer; because there is no truth more obvious or better known, from which as a consequence it may be deduced. But if we say, *This world had a beginning;* the assertion is indeed equally true, but shines not forth with the same degree of evidence. We find great difficulty in conceiving how the world could be made out of nothing: and are not brought to a free and full consent, until by reasoning we arrive at a clear view of the absurdity involved in the contrary supposition. Hence this proposition is of the kind we call *demonstrable*, inasmuch as its truth is not immediately perceived by the mind, but yet may be made appear by means of others more known and obvious, whence it follows as an unavoidable consequence.

50 Self-evident truths the first principles of reasoning.

II. From what has been said, it appears, that reasoning is employed only about demonstrable propositions, and that our intuitive and self-evident perceptions are the ultimate foundation on which it rests.

III. Self-evident propositions furnish the first principles of reasoning; and it is certain, that if in our researches we employ only such principles as have this character of self-evidence, and apply them according to the rules to be afterwards explained, we shall be in no danger of error in advancing from one discovery to another. For this we may appeal to the writings of the mathematicians, which being conducted by the express model here mentioned, are an incontestable proof of the firmness and stability of human knowledge, when built upon so sure a foundation. For not only have the propositions of this science stood the test of ages; but are found attended with that invincible evidence, as forces the assent of all who duly consider the proofs upon which they are established. Since the mathematicians are universally allowed to have hit upon the right method of arriving at unknown truths, since they have been the happiest in the choice as well as the application of their principles, it may not be amiss to explain here their method of stating self-evident propositions, and applying them to the purposes of demonstration.

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51 Definitions a great help to clearness and evidence in knowledge.

IV. First then it is to be observed, that they have been very careful in ascertaining their ideas, and fixing the signification of their terms. For this purpose they begin with *definitions*, in which the meaning of their words is so distinctly explained, that they cannot fail to excite in the mind of an attentive reader the very same ideas as are annexed to them by the writer. And indeed the clearness and irresistible evidence of mathematical knowledge is owing to nothing so much as this care in laying the foundation. Where the relation between any two ideas is accurately and justly traced, it will not be difficult for another to comprehend that relation, if in setting himself to discover it he brings the very same ideas into comparison. But if, on the contrary, he affixes to his words ideas different from those that were in the mind of him who first advanced the demonstration: it is evident that as the same ideas are not compared, the same relation cannot subsist, insomuch that a proposition will be rejected as false, which, had the terms been rightly understood, must have appeared incontestably true. A square, for instance, is a figure bounded by four equal right lines, joined together at right angles. Here the nature of the angles make no less a part of the idea than the equality of the sides: and many properties demonstrated of the square flow entirely from its being a rectangular figure. If therefore we suppose a man, who has formed a partial notion of a square, comprehending only the equality of its sides, without regard to the angles, reading some demonstration that implies also this latter consideration; it is plain he would reject it as not universally true, inasmuch as it could not be applied where the sides were joined together at equal angles. For this last figure, answering still to his idea of a square, would be yet found without the property assigned to it in the proposition. But if he comes afterwards to correct his notion, and render his idea complete, he will then readily own the truth and justness of the demonstration.

52 Mathematicians, by beginning with them procure a ready reception to the truths they advance always

V. We see, therefore, that nothing contributes so much to the improvement and certainty of human knowledge, as the having determinate ideas, and keeping them steady and invariable in all our discourses and reasonings about them. And on this account it is, that mathematicians, as was before observed,

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always begin by defining their terms, and distinctly unfolding the notions they are intended to express. Hence such as apply themselves to these studies have exactly the same views of things; and, bringing always the very same ideas into comparison, readily discern the relations between them. It is likewise of importance, in every demonstration, to express the same *idea* invariably by the same word. From this practice mathematicians never deviate; and if it be necessary in their demonstrations, where the reader's comprehension is *aided* by a diagram, it is much more so in all reasonings about moral or intellectual truths where the ideas cannot be represented by a diagram. The observation of this rule may sometimes be productive of ill-sounding periods; but when *truth* is the object, *sound* ought to be despised.

53 The establishing of principles, the second step in mathematical knowledge.

VI. When the mathematicians have taken this first step, and made known the ideas whose relations they intend to investigate, their next care is to lay down some self-evident truths, which may serve as a foundation for their future reasonings. And here indeed they proceed with remarkable circumspection, admitting no principles but what flow immediately from their definitions, and necessarily force themselves upon a mind in any degree attentive to its ideas. Thus a *circle* is a figure formed by a right line moving round some fixed point in the same plane. The fixed point round which the line is supposed to move, and where one of its extremities terminates, is called the *centre* of the circle. The other extremity, which is conceived to be carried round until it returns to the point whence it first set out, describes a curve running into itself, and termed the *circumference*. All right lines drawn from the centre to the circumference are called *radii*. From these definitions compared, geometricians derive this self-evident truth; *that the radii of the same circle are all equal to one another*.

54 Propositions divided into speculative and practical.

VII. We now observe, that in all propositions we either affirm or deny some property of the idea that constitutes the subject of our judgment, or we maintain that something may be done or effected. The first sort are called *speculative* propositions, as in the example mentioned above, the *radii of the same circle are all equal one to another*. The others are called *practical*, for a reason too obvious to be mentioned; thus, *that a right line may be drawn from one point to another* is a practical proposition; inasmuch as it expressed that something may be done.

55 Hence mathematical principles distinguished into axioms and postulates,

VIII. From this twofold consideration of propositions arises the twofold division of mathematical principles into axioms and postulates. By an *axiom* they understand any self-evident speculative truth; as, *That the whole is greater than its parts: That things equal to one and the same thing are equal to one another*. But a self-evident practical proposition is what they call a *postulate*. Such are those of Euclid; *that a finite right line may be continued directly forwards; that a circle may be described about any centre with any distance*. And here we are to observe, that as in an axiom the agreement or disagreement between the subject and predicate must come under the immediate inspection of the mind; so in a postulate, not only the possibility of the thing asserted must be evident at first view, but also the manner in which it may be effected. For where this manner is not of itself apparent, the proposition comes under the notion of the demonstrable kind, and is treated as such by geometrical writers. Thus, *to draw a right line from one point to another*, is assumed by Euclid as a postulate, because the manner of doing it is so obvious, as to require no previous teaching. But then it is not equally evident, how we are to construct an equilateral triangle. For this reason he advances it as a demonstrable proposition, lays down rules for the exact performance, and at the same time proves, that if these rules are followed, the figure will be justly described.

Of Judgment.

56 and demonstrable propositions into theorems and problems.

IX. This leads us to take notice, that as self-evident truths are distinguished into different kinds, according as they are speculative or practical; so is it also with demonstrable propositions. A demonstrable speculative proposition is by mathematicians called a *theorem*. Such is the famous 47th proposition of the first book of the Elements, known by the name of the *Pythagoric theorem*, from its supposed inventor Pythagoras, viz. "that in every right-angled triangle, the square described upon the side subtending the right angle is equal to both the squares described upon the sides containing the right angle." On the other hand, a demonstrable practical proposition is called a *problem*; as where Euclid teaches us to describe a square upon a given right line.

57 Corollaries are obvious deductions from theorems or problems.

X. It may not be amiss to add, that, besides the four kinds of propositions already mentioned, mathematicians have also a fifth, known by the name of *corollaries*. These are usually subjoined to theorems or problems, and differ from them only in this: that they flow from what is there demonstrated in so obvious a manner as to discover their dependence upon the proposition whence they are deduced, almost as soon as proposed. Thus Euclid having demonstrated, "that in every right-lined triangle all the three angles taken together are equal to two right angles;" adds by way of corollary, "that all the three angles of any one triangle taken together are equal to all the three angles of any other triangle taken together: which is evident at first sight; because in all cases they are equal to two right ones, and things equal to one and the same thing are equal to one another.

58 Scholia serve the purposes of annotations or a comment.

XI. The scholia of mathematicians are indifferently annexed to definitions, propositions, or corollaries; and answer the same purposes as annotations upon a classic author. For in them occasion is taken to explain whatever may appear intricate and obscure in a train of reasoning; to answer objections, to teach the application and uses of propositions; to lay open the original and history of the several discoveries made in the science; and, in a word, to acquaint us with all such particulars as deserve to be known, whether considered as points of curiosity or profit.

PART III. OF REASONING.

Chap. I. *Of Reasoning in general, and the Parts of which it consists.*

IT often happens in comparing ideas together, that their agreement or disagreement cannot be discerned at first view, especially if they are of such a nature as not to admit of an exact application one to another.

59 Remote relations discovered by means of intermediate ideas.

When, for instance, we compare two figures of a different make, in order to judge of their equality or inequality, it is plain, that by barely considering the figures themselves, we cannot arrive at an exact determination; because, by reason of their disagreeing forms, it is impossible so to put them together, as that their several parts shall mutually coincide. Here then it becomes necessary to look out for some third idea that will admit of such an application as the present case requires; wherein if we succeed, all difficulties vanish, and the relation we are in quest of may be traced with ease. Thus, right-lined figures are all reduced to squares, by means of which we can measure their areas, and determine exactly their agreement or disagreement in point of magnitude.

60 This manner of arriving at truth termed reasoning.

II. But how can any third idea serve to discover a relation between two others? The answer is, By being compared severally with these others; for such a comparison enables us to see how far the ideas with which this third is compared are connected or disjoined between themselves. In the example mentioned above of two right-lined figures, if we compare each of them with some square whose area is known, and find the one exactly equal to it, and the other less by a square inch, we immediately conclude that the area of the first figure is a square inch greater than that of the second. This manner of determining the relation between any two ideas, by the intervention of some third with which they may be compared, is that which we call *reasoning*; and is indeed the chief instrument by which we push on our discoveries, and enlarge our knowledge. The great art lies in finding out such intermediate ideas, as when compared with the others in the question, will furnish evident and known truths; because, as will afterwards appear, it is only by means of them that we arrive at the knowledge of what is hidden and remote.

61 The parts that constitute an act of reasoning and a syllogism.

III. Hence it appears, that every act of reasoning necessarily includes three distinct judgments; two wherein the ideas whose relation we want to discover are severally compared with the middle idea, and a third wherein they are themselves connected or disjoined, according to the result of that comparison. Now, as in the second part of logic, our judgments, when put into words, were called propositions, so here in the third part the expressions of our reasonings are termed *syllogisms*. And hence it follows, that as every act of reasoning implies three several judgments, so every syllogism must include three distinct propositions. When a reasoning is thus put into words, and appears in form of a syllogism, the intermediate idea made use of, to discover the agreement or disagreement we search for, is called the *middle term*; and the two ideas themselves with which this third is compared, go by the name of the *extremes*.

62 Instance, man and accountableness.

IV. But as these things are best illustrated by examples; let us, for instance, set ourselves to inquire *whether men are accountable for their actions*. As the relation between the ideas of *man* and *accountableness*, come not within the immediate view of the mind, our first care must be to find out some third idea that will enable us the more easily to discover and trace it. A very small measure of reflection is sufficient to inform us, that no creature can be accountable for his actions, unless we suppose him capable of distinguishing the good from the bad; that is, unless we suppose him possessed of reason. Nor is this alone sufficient. For what would it avail him to know good from bad actions, if he had no freedom of choice, nor could avoid the one and pursue the other? hence it becomes necessary to take in both considerations in the present case. It is at the same time equally apparent, that wherever there is ability of distinguishing good from bad actions, and of pursuing the one and avoiding the other, there also a creature is accountable. We have then got a third idea, with which *accountableness* is inseparably connected, viz. *reason and liberty*; which are here to be considered as making up one complex conception. Let us now take this middle idea, and compare it with the other term in the question, viz. *man*, and we all know by experience that it may be affirmed of him. Having thus by means of the intermediate idea formed two several judgments, viz. *that man is possessed of reason and liberty*; and *that reason and liberty imply accountableness*; a third obviously and necessarily follows, viz. *that man is accountable for his actions*. Here then we have a complete act of reasoning, in which, according to what has been already observed, there are three distinct judgments: two that may be styled previous, inasmuch as they lead to the other, and arise from comparing the middle idea with the two ideas in the question: the third is a consequence of these previous acts, and flows from combining the extreme ideas between themselves. If now we put this reasoning into words, it exhibits what logicians term a syllogism; and, when proposed in due form, runs thus:

> "Every creature possessed of reason and liberty is
> "accountable for his actions.
> "Man is a creature possessed of reason and liberty:
> "Therefore man is accountable for his actions."

63 Premises, conclusion, extremes, middle term.

V. In this syllogism we may observe, that there are three several propositions expressing the three judgments implied in the act of reasoning; and so disposed, as to represent distinctly what passes within the mind in tracing the more distant relations of its ideas. The two first propositions answer the two previous judgments in reasoning, and are called the *premises*, because they are placed before the other. The third is termed the *conclusion*, as being gained in consequence of what was asserted in the premises. We are also to remember, that

that the terms expressing the two ideas whose relations we inquire after, as here *man* and *accountableness*, are in general called the *extremes;* and that the intermediate idea, by means of which the relation is traced, viz. *a creature possessed of reason and liberty*, takes the name of the *middle term*. Hence it follows, that by the *premises* of a syllogism we are always to understand the two propositions where the middle term is severally compared with the *extremes;* for these constitute the previous judgments, whence the truth we are in quest of is by reasoning deduced. The *conclusion* is that other proposition, in which the *extremes* themselves are joined or separated agreeably to what appears upon the above comparison.

64 Major and minor term, major and minor proposition.

VI. The conclusion is made up of the extreme terms of the syllogism: and the extreme, which serves as the predicate of the conclusion, goes by the name of the *major term:* the other extreme, which makes the subject in the same proposition, is called the *minor term*. From this distinction of the extremes arises also a distinction between the premises, where these extremes are severally compared with the middle term. That proposition which compares the greater extreme, or the predicate of the conclusion, with the middle term, is called the *major proposition*: the other, wherein the same middle term is compared with the subject of the conclusion or lesser extreme, is called the *minor proposition*. All this is obvious from the syllogism already given, where the conclusion is, *Man is accountable for his actions*. For here the predicate *accountable for his actions* being connected with the middle term in the first of the two premises, *every creature possessed of reason and liberty is accountable for his actions*, gives what we call the *major proposition*. In the second of the premises, *man is a creature possessed of reason and liberty*, we find the lesser extreme, or subject of the conclusion, viz. *man*, connected with the same middle term, whence it is known to be the *minor proposition*. When a syllogism is proposed in due form, the major proposition is always placed first, the minor next, and the conclusion last.

65 In a single act of reasoning the premises must be intuitive truths.

VII. These things premised, we may in the general define reasoning to be an act or operation of the mind, deducing some unknown proposition from other previous ones that are evident and known. These previous propositions, in a simple act of reasoning, are only two in number; and it is always required that they be of themselves apparent to the understanding, insomuch that we assent to and perceive the truth of them as soon as proposed. In the syllogism given above, the premises are supposed to be self-evident truths; otherwise the conclusion could not be inferred by a single act of reasoning. If, for instance, in the major, *every creature possessed of reason and liberty is accountable for his actions*, the connexion between the subject and predicate could not be perceived by a bare attention to the ideas themselves; it is evident that this proposition would no less require a proof than the conclusion deduced from it. In this case a new middle term must be sought for, to trace the connexion here supposed; and this of course furnishes another syllogism, by which having established the proposition in question, we are then, and not before, at liberty to use it in any succeeding train of reasoning. And should it so happen, that in this second essay there was still some previous proposition whose truth did not appear at first sight, we must then have recourse to a third syllogism, in order to lay open that truth to the mind: because so long as the premises remain uncertain, the conclusion built upon them must be so too. When, by conducting our thoughts in this manner, we at last arrive at some syllogism where the previous propositions are intuitive truths; the mind then rests in full security, as perceiving that the several conclusions it has passed through stand upon the immoveable foundation of self-evidence, and when traced to their source terminate in it.

66 Reasoning, in the highest exercise of it, only a concatenation of syllogisms.

VIII. We see, therefore, that in order to infer a conclusion by a single act of reasoning, the premises must be intuitive propositions. Where they are not, previous syllogisms are required; in which case reasoning becomes a complicated act, taking in a variety of successive steps. This frequently happens in tracing the more remote relation of our ideas; where, many middle terms being called in, the conclusion cannot be made out but in consequence of a series of syllogisms following one another in train. But although in this concatenation of propositions, those that form the premises of the last syllogism are often considerably removed from self-evidence; yet if we trace the reasoning backwards, we shall find them the conclusions of previous syllogisms, whose premises approach nearer and nearer to intuition in proportion as we advance, and are found at last to terminate in it. And if, after having thus unravelled a demonstration, we take it the contrary way; and observe how the mind, setting out with intuitive perceptions, couples them together to form a conclusion: how, by introducing this conclusion into another syllogism, it still advances one step father; and so proceeds, making every new discovery subservient to its future progress; we shall then perceive clearly, that reasoning, in the highest sense of that faculty, is no more than an orderly combination of those simple acts which we have already so fully explained.

67 Requires intuitive certainty in every step of the progression.

IX. Thus we see, that reasoning, beginning with first principles, rises gradually from one judgment to another, and connects them in such manner, that every stage of the progression brings intuitive certainty along with it. And now at length we may clearly understand the definition given above of this distinguishing faculty of the human mind. Reason, we have said, is the ability of deducing unknown truths from principles or propositions that are already known. This evidently appears by the foregoing account, where we see that no proposition is admitted into a syllogism, to serve as one of the previous judgments on which the conclusion rests, unless it is itself a known and established truth, whose connexion with self-evident principles has been already traced.

Chap. II. *Of the several kinds of Reasoning: and first, of that by which we determine the Genera and Species of Things.*

68 Reasoning twofold.

I. All the aims of human reason may in the general be reduced to these two: 1. To rank things under those universal ideas to which they truly belong; and, 2. To ascribe to them their several attributes and properties in consequence of that distribution.

II. One

Of Reasoning.

69 The first kind regards the genera and species of things.

II. One great aim of human reason is to determine the genera and species of things. We have seen in the First Part of this treatise, how the mind proceeds in framing general ideas*. We have also seen in the Second Part, how by means of these general ideas we come by universal propositions. Now as in these universal propositions we affirm some property of a genus or species, it is plain that we cannot apply this property to particular objects till we have first determined whether they are comprehended under that general idea of which the property is affirmed. Thus there are certain properties belonging to all *even* numbers, which nevertheless cannot be applied to any particular number, until we have first discovered it to be of the species expressed by that natural name. Hence reasoning begins with referring things to their several divisions and classes in the scale of our ideas; and as these divisions are all distinguished by particular names, we hereby learn to apply the terms expressing general conceptions to such particular objects as come under our immediate observation.

* See *Foot Note*, p. 136.

70 The steps by which we arrive at conclusions of this sort.

III. Now, in order to arrive at these conclusions, by which the several objects of perception are brought under general names, two things are manifestly necessary. First, That we take a view of the idea itself denoted by that general name, and carefully attend to the distinguishing marks which serve to characterize it. Secondly, That we compare this idea with the object under consideration, observing diligently wherein they agree or differ. If the idea is found to correspond with the particular object, we then without hesitation apply the general name; but if no such correspondence intervenes, the conclusion must necessarily take a contrary turn. Let us, for instance, take the number *eight*, and consider by what steps we are led to pronounce it an *even* number. First then, we call to mind the idea signified by the expression *an even number*, viz. that it is a number divisible into two equal parts. We then compare this idea with the number *eight*, and finding them manifestly to agree, see at once the necessity of admitting the conclusion. These several judgments therefore transferred into language, and reduced to the form of a syllogism, appear thus:

"Every number that may be divided into two equal "parts is an *even* number:
"The number eight may be divided into two equal "parts;
"Therefore the number *eight* is an *even* number."

71 Those steps always followed, though in familiar cases we do not always attend to them.

IV. Here it may be observed, that where the general idea, to which particular objects are referred, is very familiar to the mind, and frequently in view; this reference, and the application of the general name, seem to be made without any apparatus of reasoning. When we see a horse in the fields, or a dog in the street, we readily apply the name of the species; habit, and a familiar acquaintance with the general idea, suggesting it instantaneously to the mind. We are not however to imagine on this account that the understanding departs from the usual rules of just thinking. A frequent repetition of acts begets a habit; and habits are attended with a certain promptness of execution, that prevents our observing the several steps and gradations by which any course of action is accomplished. But in other instances, where we judge not by precontracted habits, as when the general idea is very complex, or less familiar to the mind, we always proceed according to the form of reasoning established above. A goldsmith, for instance, who is in doubt as to any piece of metal, whether it be of the species called *gold*, first examines its properties, and then comparing them with the general idea signified by that name, if he finds a perfect correspondence, no longer hesitates under what class of metals to rank it.

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72 The great importance of this branch of reasoning;

V. Nor let it be imagined that our researches here, because in appearance bounded to the imposing of general names upon particular objects, are therefore trivial and of little consequence. Some of the most considerable debates among mankind, and such too as nearly regard their lives, interest, and happiness, turn wholly upon this article. Is it not the chief employment of our several courts of judicature to determine in particular instances, what is law, justice, and equity? Of what importance is it in many cases to decide aright whether an action shall be termed *murder* or *manslaughter*? We see then that no less than the lives and fortunes of men depend often upon these decisions. The reason is plain. Actions, when once referred to a general idea, draw after them all that may be affirmed of that idea; insomuch that the determining the species of actions is all one with determining what proportion of praise or dispraise, commendation or blame, &c. ought to follow them. For as it is allowed that murder deserves death; by bringing any particular action under the head of murder, we of course decide the punishment due to it.

73 and the exact observance of it practised by mathematicians.

VI. But the great importance of this branch of reasoning, and the necessity of care and circumspection in referring particular objects to general ideas, is still farther evident from the practice of the mathematicians. Every one who has read Euclid, knows, that he frequently requires us to draw lines through certain points, and according to such and such directions. The figures thence resulting are often squares, parallelograms, or rectangles. Yet Euclid never supposes this from their bare appearance, but always demonstrates it upon the strictest principles of geometry. Nor is the method he takes in any thing different from that described above. Thus, for instance, having defined a square to be a figure bounded by four equal sides joined together at right angles; when such a figure arises in any construction previous to the demonstration of a proposition, yet he never calls it by that name until he has shown that its sides are equal, and all its angles right ones. Now this is apparently the same form of reasoning we have before exhibited in proving *eight* to be an even number.

74 Fixed and invariable ideas with a steady application of names, renders this part of knowledge both easy and certain.

VII. Having thus explained the rules by which we are to conduct ourselves in ranking particular objects under general ideas, and shown their conformity to the practice and manner of the mathematicians: it remains only to observe, that the true way of rendering this part of knowledge both easy and certain is, by habituating ourselves to clear and determinate ideas, and keeping them steadily annexed to their respective names. For as all our aim is to apply general words aright, if these words stand for invariable ideas that are perfectly known to the mind, and can be readily distinguished upon occasion, there will be little danger

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of mistake or error in our reasonings. Let us suppose that, by examining any object, and carrying our attention successively from one part to another, we have acquainted ourselves with the several particulars observable in it. If among these we find such as constitute some general idea, framed and settled beforehand by the understanding, and distinguished by a particular name, the resemblance thus known and perceived necessarily determines the species of the object, and thereby gives it a right to the name by which that species is called. Thus four equal sides, joined together at right angles, make up the notion of a *square*. As this is a fixed and invariable idea, without which the general name cannot be applied; we never call any particular figure a *square* until it appears to have these several conditions; and contrarily, wherever a figure is found with these conditions, it necessarily takes the name of a *square*. The same will be found to hold in all our other reasonings of this kind, where nothing can create any difficulty but the want of settled ideas. If, for instance, we have not determined within ourselves the precise notion denoted by the word *manslaughter*, it will be impossible for us to decide whether any particular action ought to bear that name: because, however nicely we examine the action itself, yet, being strangers to the general idea with which it is to be compared, we are utterly unable to judge of their agreement or disagreement. But if we take care to remove this obstacle, and distinctly trace the two ideas under consideration, all difficulties vanish, and the resolution becomes both easy and certain.

VIII. Thus we see of what importance it is towards the improvement and certainty of human knowledge, that we accustom ourselves to clear and determinate ideas, and a steady application of words.

Chap. III. *Of Reasoning, as it regards the Powers and Properties of Things, and the Relations of our general Ideas.*

75 The distinction of reasoning, as it regards the sciences, and as it concerns common life.

I. We now come to the second great end which men have in view in their reasonings; namely, the discovering and ascribing to things their several attributes and properties. And here it will be necessary to distinguish between reasoning, as it regards the sciences, and as it concerns common life. In the sciences, our reason is employed chiefly about universal truths, it being by them alone that the bounds of human knowledge are enlarged. Hence the division of things into various classes, called otherwise *genera* and *species*. For these universal ideas being set up as the representatives of many particular things, whatever is affirmed of them may be also affirmed of all the individuals to which they belong. *Murder*, for instance, is a general idea, representing a certain species of human actions. Reason tells us that the punishment due to it is *death*. Hence every particular action, coming under the notion of *murder*, has the punishment of *death* allotted to it. Here then we apply the general truth to some obvious instance; and this is what properly constitutes the reasoning of common life. For men, in their ordinary transactions and intercourse one with another, have, for the most part, to do only with particular objects. Our friends and relations, their characters and behaviour, the constitution of the several bodies that surround us, and the uses to which they may be applied, are what chiefly engage our attention. In all these, we reason about particular things; and the whole result of our reasoning is, the applying the general truths of the sciences in the ordinary transactions of human life. When we see a viper, we avoid it. Wherever we have occasion for the forcible action of water to move a body that makes considerable resistance, we take care to convey it in such a manner that it shall fall upon the object with impetuosity. Now all this happens in consequence of our familiar and ready application of these two general truths. *The bite of a viper is mortal. Water falling upon a body with impetuosity, acts very forcibly towards setting it in motion.* In like manner, if we set ourselves to consider any particular character, in order to determine the share of praise or dispraise that belongs to it, our great concern is to ascertain exactly the proportion of virtue and vice. The reason is obvious. A just determination, in all cases of this kind, depends entirely upon an application of these general maxims of morality: *Virtuous actions deserve praise; vicious actions deserve blame.*

Of Reasoning.

76 The steps by which we proceed in the reasoning of common life.

II. Hence it appears that reasoning, as it regards common life, is no more than the ascribing the general properties of things to those several objects with which we are more immediately concerned, according as they are found to be of that particular division or class to which the properties belong. The steps then by which we proceed are manifestly these. First, We refer the object under consideration to some general idea or class of things. We then recollect the several attributes of that general idea. And, lastly, Ascribe all those attributes to the present object. Thus, in considering the character of *Sempronius*, if we find it to be of the kind called *virtuous*, when we at the same time reflect that a virtuous character is deserving of esteem, it naturally and obviously follows that Sempronius is so too. These thoughts put into a *syllogism*, in order to exhibit the form of reasoning here required, run thus:

"Every virtuous man is worthy of esteem.
"*Sempronius* is a virtuous man:
"Therefore *Sempronius* is worthy of esteem."

77 The connexion and dependence of the two grand branches of reasoning one upon another.

III. By this *syllogism* it appears, that before we affirm any thing of a particular object, that object must be referred to some general idea. Sempronius is pronounced worthy of esteem only in consequence of his being a virtuous man, or coming under that general notion. Hence we see the necessary connexion of the various parts of reasoning, and the dependence they have one upon another. The determining the genera and species of things is, as we have said, one exercise of human reason; and here we find that this exercise is the first in order, and previous to the other, which consists in ascribing to them their powers, properties, and relations. But when we have taken this previous step, and brought particular objects under general names; as the properties we ascribe to them are no other than those of the general idea, it is plain that, in order to a successful progress in this part of knowledge, we must thoroughly acquaint ourselves with the several relations and attributes of these our general ideas.

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ideas. When this is done, the other part will be easy, and requires scarce any labour or thought, as being no more than an application of the general form of reasoning represented in the foregoing syllogism. Now, as we have already sufficiently shown how we are to proceed in determining the genera and species of things, which, as we have said, is the previous step to this second branch of human knowledge; all that is farther wanting towards a due explanation of it is, to offer some considerations as to the manner of investigating the general relations of our ideas. This is the highest exercise of the powers of the understanding, and that by means whereof we arrive at the discovery of universal truths; insomuch that our deductions in this way constitute that particular species of reasoning which we have before said regards principally the sciences.

78 Two things required to make a good reasoner.

IV. But that we may conduct our thoughts with some order and method, we shall begin with observing, that the relations of our general ideas are of two kinds: either such as immediately discover themselves, upon comparing the ideas one with another; or such as, being more remote and distant, require art and contrivance to bring them into view. The relations of the first kind furnish us with intuitive and self-evident truths: those of the second are traced by reasoning, and a due application of intermediate ideas. It is of this last kind that we are to speak here, having despatched what was necessary with regard to the other in the Second Part. As, therefore, in tracing the more distant relations of things, we must always have recourse to intervening ideas, and are more or less successful in our researches according to our acquaintance with these ideas, and ability of applying them; and it is evident, that to make a good reasoner, two things are principally required. *First*, An extensive knowledge of those intermediate ideas, by means of which things may be compared one with another. *Secondly*, The skill and talent of applying them happily in all particular instances that come under consideration.

79 First, An extensive knowledge of intermediate ideas.

V. In order to our successful progress in reasoning, we must have an extensive knowledge of those intermediate ideas by means of which things may be compared one with another. For as it is not every idea that will answer the purpose of our inquiries, but such only as are peculiarly related to the objects about which we reason, so as, by a comparison with them to furnish evident and known truths; nothing is more apparent than that the greater variety of conceptions we can call into view, the more likely we are to find some among them that will help us to the truths here required. And, indeed, it is found to hold in experience, that in proportion as we enlarge our views of things, and grow acquainted with a multitude of different objects, the reasoning faculty gathers strength: for, by extending our sphere of knowledge, the mind acquires a certain force and penetration, as being accustomed to examine the several appearances of its ideas, and observe what light they cast one upon another.

VI. This is the reason why, in order to excel remarkably in any one branch of learning, it is necessary to have at least a general acquaintance with the whole circle of arts and sciences. The truth of it is, all the various divisions of human knowledge are very nearly related among themselves, and, in innumerable instances, serve to illustrate and set off each other. And although it is not to be denied that, by an obstinate application to one branch of study, a man may make considerable progress, and acquire some degree of eminence in it; yet his views will be always narrow and contracted, and he will want that masterly discernment which not only enables us to pursue our discoveries with ease, but also, in laying them open to others, to spread a certain brightness around them. But when our reasoning regards a particular science, it is farther necessary that we more nearly acquaint ourselves with whatever relates to that science. A general knowledge is a good preparation, and enables us to proceed with ease and expedition in whatever branch of learning we apply to. But then, in the minute and intricate questions of any science, we are by no means qualified to reason with advantage until we have perfectly mastered the science to which they belong.

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80 To excel in any one branch of learning we must be in general acquainted with the whole circle of arts and sciences.

81 Secondly, The skill of applying intermediate ideas happily in particular instances.

VII. We come now to the second thing required, in order to a successful progress in reasoning; namely, the skill and talent of applying intermediate ideas happily in all particular instances that come under consideration. And here, rules and precepts are of little service. Use and experience are the best instructors. For, whatever logicians may boast of being able to form perfect reasoners by book and rule, we find by experience, that the study of their precepts does not always add any great degree of strength to the understanding. In short, it is the habit alone of reasoning that makes a reasoner. And therefore the true way to acquire this talent is, by being much conversant in those sciences where the art of reasoning is allowed to reign in the greatest perfection. Hence it was that the ancients, who so well understood the manner of forming the mind, always began with *mathematics*, as the foundation of their philosophical studies. Here the understanding is by degrees habituated to truth, contracts insensibly a certain fondness for it, and learns never to yield its assent to any proposition but where the evidence is sufficient to produce full conviction. For this reason *Plato* has called mathematical demonstrations the *catharties* or purgatives of the soul, as being the proper means to cleanse it from error, and restore that natural exercise of its faculties in which just thinking consists.

82 The study of mathematical demonstrations of great avail in this respect

VIII. If therefore we would form our minds to a habit of reasoning closely and in train, we cannot take any more certain method than the exercising ourselves in mathematical demonstrations, so as to contract a kind of familiarity with them. Not that we look upon it as necessary that all men should be deep mathematicians; but that, having got the way of reasoning which that study necessarily brings the mind to, they may be able to transfer it to other parts of knowledge, as they shall have occasion.

83 As also of such authors on other subjects, as are distinguished for strength and justness of reasoning.

IX. But although the study of mathematics be of all others the most useful to form the mind and give it an early relish of truth, yet ought not other parts of philosophy to be neglected. For there also we meet with many opportunities of exercising the powers of the understanding; and the variety of subjects naturally

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rally leads us to observe all those different turns of thinking that are peculiarly adapted to the several ideas we examine, and the truth we search after. A mind thus trained acquires a certain mastery over its own thoughts, insomuch that it can range and model them at pleasure, and call such into view as best suit its present designs. Now in this the whole art of reasoning consists; from among a great variety of different ideas to single out those that are most proper for the business in hand, and to lay them together in such order, that from plain and easy beginnings, by gentle degrees, and a continued train of evident truths, we may be insensibly led on to such discoveries, as at our first setting out appeared beyond the reach of human understanding. For this purpose, besides the study of mathematics before recommended, we ought to apply ourselves diligently to the reading of such authors as have distinguished themselves for strength of reasoning, and a just and accurate manner of thinking. For it is observable, that a mind exercised and seasoned to truth, seldom rests satisfied in a bare contemplation of the arguments offered by others; but will be frequently assaying its own strength, and pursuing its discoveries upon the plan it is most accustomed to. Thus we insensibly contract a habit of tracing truth from one stage to another, and of investigating those general relations and properties which we afterwards ascribe to particular things, according as we find them comprehended under the abstract ideas to which the properties belong.

Chap IV. *Of the Forms of Syllogisms.*

84 The figures of syllogisms.

I. Hitherto we have contented ourselves with a general notion of syllogisms, and of the parts of which they consist. It is now time to enter a little more particularly into the subject, to examine their various forms, and lay open the rules of argumentation proper to each. In the syllogisms mentioned in the foregoing chapters, we may observe, that the *middle term* is the subject of the *major* proposition, and the predicate of the *minor*. This disposition, though the most natural and obvious, is not however necessary; it frequently happening, that the middle term is the subject in both the premises, or the predicate in both; and sometimes directly contrary to its disposition in the foregoing chapters, the predicate in the major, and the subject in the minor. Hence the distinction of syllogisms into various kinds, called *figures* by logicians. For figure, according to their use of the word, is nothing else but the order and disposition of the middle term in any syllogism. And as this disposition is, we see, fourfold, so the figures of syllogisms thence arising are four in number. When the middle term is the subject of the major proposition, and the predicate of the minor, we have what is called the *first figure*; As,

> "No work of God is bad:
> "The natural passions and appetites of men are
> "the work of God:
> "Therefore none of them is bad."

If, on the other hand, it is the predicate of both the premises, the syllogism is said to be the *second figure*: As,

> "Whatever is bad is not the work of God:
> "All the natural passions and appetites of men
> "are the work of God:
> "Therefore the natural passions and appetites of
> "men are not bad."

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Again, In the *third figure*, the middle term is the subject of the two premises: As,

> "All Africans are black:
> "All Africans are men:
> "Therefore some men are black."

And lastly, By making it the predicate of the major, and subject of the minor, we obtain syllogisms in the *fourth figure*: As,

> "The only Being who ought to be worshipped is
> "the Creator and Governor of the world:
> "The Creator and Governor of the world is
> "God:
> "Therefore God is the only Being who ought to
> "be worshipped."

85 The moods of syllogisms.

II. But, besides this fourfold distinction of syllogisms, there is also a farther subdivision of them in every figure, arising from the *quantity* and *quality*, as they are called, of the propositions. By quantity we mean the consideration of propositions, as universal or particular; by quality, as affirmative or negative.

Now as, in all the several dispositions of the middle term, the propositions of which a syllogism consists may be either universal or particular, affirmative or negative; the due determination of these, and so puting them together as the laws of argumentation require, constitute what logicians call the *moods* of syllogisms. Of these moods there is a determinate number to every figure, including all the possible ways in which propositions differing in quantity or quality can be combined, according to any disposition of the middle term, in order to arrive at a just conclusion.

The first figure has only four legitimate moods. The major proposition in this figure must be universal, and the minor affirmative; and it has this property, that it yields conclusions of all kinds, affirmative and negative, universal and particular.

The second figure has also four legitimate moods. Its major proposition must be universal, and one of the premises must be negative. It yields conclusions both universal and particular, but all negative.

The third figure has six legitimate moods. Its minor must always be affirmative; and it yields conclusions both affirmative and negative, but all particular.

——These are all the figures which were admitted by the inventor of syllogisms, and of which, so far as we know, the number of legitimate moods has been ascertained, and severally demonstrated. In *every figure* it will be found upon trial, that there are *sixty-four* different moods of syllogism; and he who thinks it worth while to construct so many in the *fourth* figure, always remembering that the *middle term* in each must be the *predicate* of the *major* and the *subject* of the *minor* proposition, will easily discern what number of these moods are *legitimate*, and give true conclusions.

Besides the rules that are proper to each figure, Aristotle has given some that are common to all, by which the legitimacy of syllogisms may be tried.

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These may be reduced to five:——1. There must be only *three terms* in a syllogism: As each term occurs in two of the propositions, it must be precisely the *same in both;* if it be *not*, the syllogism is said to have *four terms*, which makes a *vicious* syllogism. 2. The *middle term* must be taken *universally* in *one* of the premises. 3. Both premises must *not be particular* propositions, nor both *negative*. 4. The *conclusion* must be *particular*, if *either* of the *premises* be *particular;* and *negative*, if *either* of the *premises* be *negative*. 5. No term can be taken *universally* in the *conclusion*, if it be *not* taken *universally* in the *premises.*

For understanding the *second* and *fifth* of these rules, it is necessary to observe, that a term is said to be taken *universally*, not only when it is the *subject* of a *universal* proposition, but also when it is the *predicate* of a *negative* proposition. On the other hand, a term is said to be taken *particularly*, when it is either the *subject* of a *particular* or the *predicate* of an *affirmative* proposition.

86 Foundation of the other division of syllogisms.

III. The division of syllogisms according to mood and figure respects those especially which are known by the name of plain simple syllogisms; that is, which are bounded to three propositions, all simple, and where the extremes and middle term are connected, according to the rules laid down above. But as the mind is not tied down to any one precise form of reasoning, but sometimes makes use of more, sometimes of fewer premises, and often takes in compound and conditional propositions, it may not be amiss to take notice of the different forms derived from this source, and explain the rules by which the mind conducts itself in the use of them.

87 Conditional syllogisms.

IV. When in any syllogism the major is a conditional proposition, the syllogism itself is termed *conditional.* Thus:

"If there is a God, he ought to be worshipped:
"But there is a God:
"Therefore he ought to be worshipped."

In this example, the major, or first proposition, is, we see, conditional, and therefore the syllogism itself is also of the kind called by that name. And here we are to observe, that all conditional propositions are made of two distinct parts: one expressing the condition upon which the predicate agrees or disagrees with the subject, as in this now before us, *if there is a God;* the other joining or disjoining the said predicate and subject, as here, *he ought to be worshipped.* The first of these parts, or that which implies the condition, is called the *antecedent;* the second, where we join or disjoin the predicate and subject, has the name of the *consequent.*

88 Ground of illation in conditional syllogisms.

V. In all propositions of this kind, supposing them to be exact in point of form, the relation between the antecedent and consequent must ever be true and real; that is, the antecedent must always contain some certain and genuine condition, which necessarily implies the consequent; for otherwise the proposition itself will be false, and therefore ought not to be admitted into our reasonings. Hence it follows, that when any conditional proposition is assumed, if we admit the antecedent of that proposition, we must at the same time necessarily admit the consequent; but if we reject the consequent, we are in like manner bound to reject the antecedent. For as the antecedent always expresses some condition which necessarily implies the truth of the consequent; by admitting the antecedent, we allow of that condition, and therefore ought also to admit the consequent. In like manner, if it appears that the consequent ought to be rejected, the antecedent evidently must be so too: because, as was just now demonstrated, the admitting of the antecedent would necessarily imply the admission also of the consequent.

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89 The two moods of conditional syllogisms.

VI. There are two ways of arguing in *hypothetical* syllogisms, which lead to a certain and unavoidable conclusion. For as the major is always a conditional proposition, consisting of an antecedent and a consequent; if the minor admits the antecedent, it is plain that the conclusion must admit the consequent. This is called arguing from the admission of the antecedent to the admission of the consequent, and constitutes that mood or species of hypothetical syllogisms which is distinguished in the schools by the name of the *modus ponens*, inasmuch as by it the whole conditional proposition, both antecedent and consequent, is established. Thus:

"If God is infinitely wise, and acts with perfect free-
"dom, he does nothing but what is best:
"But God is infinitely wise, and acts with perfect
"freedom:
"Therefore he does nothing but what is best."

Here we see the antecedent or first part of the conditional proposition is established in the minor, and the consequent or second part in the conclusion; whence the syllogism itself is an example of the *modus ponens.* But if now we on the contrary suppose that the miner reject the consequent, then it is apparent that the conclusion must also reject the antecedent. In this case we are said to argue from the removal of the consequent to the removal of the antecedent, and the particular mood or species of syllogisms thence arising is called by logicians the *modus tollens;* because in it both antecedent and consequent are rejected or taken away, as appears by the following example:

"If God were not a Being of infinite goodness, nei-
"ther would he consult the happiness of his crea-
"tures:
"But God does consult the happiness of his crea-
"tures:
"Therefore he is a Being of infinite goodness.

90 They include all the legitimate ways of arguing.

VII. These two species take in the whole class of conditional syllogisms, and include all the possible ways of arguing that lead to a legitimate conclusion; because we cannot here proceed by a contrary process of reasoning, that is, from the removal of the antecedent to the removal of the consequent, or from the establishing of the consequent to the establishing of the antecedent. For although the antecedent always expresses some real condition, which, once admitted, necessarily implies the consequent, yet it does not follow that there is therefore no other condition; and if so, then, after removing the antecedent, the consequent may still hold, because of some other determination that infers it. When we say, *If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat;* the proposition is certainly true; and, admitting the antecedent, we must also admit

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admit the consequent. But as there are others ways by which a stone may gather heat, it will not follow, from the ceasing of the before-mentioned condition, that therefore the consequent cannot take place. In other words, we cannot argue: *But the stone has not been exposed to the rays of the sun; therefore neither has it any degree of heat:* Inasmuch as there are a great many other ways by which heat might have been communicated to it. And if we cannot argue from the removal of the anteeedent to the removal of the consequent, no more can we from the admission of the consequent to the admission of the anteeedent: because, as the consequent may flow from a great variety of different suppositions, the allowing of it does not determine the precise supposition, but only that some one of them must take place. Thus in the foregoing proposition, *If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat;* admitting the consequent, viz. *that it has contracted a certain degree of heat*, we are not therefore bound to admit the antecedent, *that it has been some time exposed to the rays of the sun:* because there are many other causes whence that heat may have proceeded. These two ways of arguing, therefore, hold not in conditional syllogisms.

91 The manner of arguing in disjunctive syllogisms.

VIII. As from the major's being a conditional proposition, we obtain the species of conditional syllogisms: so, where it is a disjunctive proposition, the syllogism to which it belongs is also called *disjunctive*, as in the following example:

"The world is either self-existent, or the work of
"some finite, or of some infinite Being:
"But it is not self-existent, nor the work of a finite
"being:
"Therefore it is the work of an infinite Being."

Now, a disjunctive proposition is that, where of several predicates, we affirm one necessarily to belong to the subject, to the exclusion of all the rest, but leave that particular one undetermined. Hence it follows, that as soon as we determine the particular predicate, all the rest are of course to be rejected; or if we reject all the predicates but one, that one necessarily takes place. When, therefore, in a disjunctive syllogism, the several predicates are enumerated in the major; if the minor establishes any one of these predicates, the conclusion ought to remove all the rest; or if, in the minor, all the predicates but one are removed, the conclusion must necessarily establish that one. Thus, in the disjunctive syllogism given above, the major affirms one of the three predicates to belong to the earth, viz. *self-existence*, or that it is *the work of a finite*, or that it is *the work of an infinite Being*. Two of these predicates are removed in the minor, viz. *self-existence*, and *the work of a finite being*. Hence the conclusion necessarily ascribes to it the third predicate, and affirms that it is *the work of an infinite Being*. If now we give the syllogism another turn, insomuch that the minor may establish one of the predicates, by affirming the earth to be *the production of an infinite Being:* then the conclusion must remove the other two, asserting it to be neither *self-existent*, nor *the work of a finite Being*. These are the forms of reasoning in these species of syllogisms, the justness of which appears at first sight: and that there can be no other, is evident from the very nature of a disjunctive proposition.

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92 Imperfect or mutilated syllogisms.

IX. In the several kinds of syllogisms hitherto mentioned, we may observe that the parts are complete; that is, the three propositions of which they consist are represented in form. But it often happens, that some one of the premises is not only an evident truth, but also familiar and in the minds of all men; in which case it is usually omitted, whereby we have an imperfect syllogism, that seems to be made up of only two propositions. Should we, for instance, argue in this manner:

"Every man is mortal:
"Therefore every king is mortal:"

the syllogism appears to be imperfect, as consisting but of two propositions. Yet it is really complete; only the minor [*every king is a man*] is omitted, and left to the reader to supply, as being a proposition so familiar and evident that it cannot escape him.

93 Enthymemes.

X. These seemingly imperfect syllogisms are called *enthymemes;* and occur very frequently in reasoning, especially where it makes a part of common conversation. Nay, there is a particular elegance in them, because, not displaying the argument in all its parts, they leave somewhat to the exercise and invention of the mind. By this means we are put upon exerting ourselves, and seem to share in the discovery of what is proposed to us. Now this is the great secret of fine writing, so to frame and put together our thoughts, as to give full play to the reader's imagination, and draw him insensibly into our very views and course of reasoning. This gives a pleasure not unlike to that which the author himself feels in composing. It besides shortens discourse, and adds a certain force and liveliness to our arguments, when the words in which they are conveyed favour the natural quickness of the mind in its operations, and a single expression is left to exhibit a whole train of thoughts.

94 Ground of reasoning in immediate consequences.

XI. But there is another species of reasoning with two propositions, which seems to be complete in itself, and where we admit the conclusion without supposing any tacit or suppressed judgment in the mind, from which it follows syllogistically. This happens between propositions, where the connexion is such, that the admission of the one necessarily and at the first sight implies the admission also of the other. For if it so falls out, that the proposition on which the other depends is self-evident, we content ourselves with barely affirming it, and infer that other by a direct conclusion. Thus, by admitting an universal proposition, we are forced also to admit of all the particular propositions comprehended under it, this being the very condition that constitutes a proposition universal. If then that universal proposition chances to be self-evident, the particular ones follow of course, without any farther train of reasoning. Whoever allows, for instance, *that things equal to one and the same thing are equal to one another*, must at the same time allow, *that two triangles, each equal to a square whose side is three inches, are also equal between themselves.* This argument, therefore,

"Things equal to one and the same thing, are equal
"to one another:

"Therefore,

" Therefore these two triangles, each equal to the
" square of a line of three inches, are equal be-
" tween themselves"—

is complete in its kind, and contains all that is necessary towards a just and legitimate conclusion. For the first or universal proposition is self-evident, and therefore requires no farther proof. And as the truth of the particular is inseparably connected with that of the universal, it follows from it by an obvious and unavoidable consequence.

95 All reducible to syllogisms of some one form or other.

XII. Now, in all cases of this kind, where propositions are deduced one from another, on account of a known and evident connection, we are said to reason by immediate consequence. Such a coherence of propositions manifest at first sight, and forcing itself upon the mind, frequently occurs in reasoning. Logicians have explained at some length the several suppositions upon which it takes place, and allow of all immediate consequences that follow in conformity to them. It is however observable, that these arguments, though seemingly complete, because the conclusion follows necessarily from the single proposition that goes before, may yet be considered as real enthymemes, whose major, which is a conditional proposition, is wanting. The syllogism but just mentioned, when represented according to this view, will run as follows:

" If things equal to one and the same thing, are
" equal to one another; these two triangles, each
" equal to a square whose side is three inches, are
" also equal between themselves.
" But things equal to one and the same thing, are
" equal to one another:
" Therefore also these triangles, &c. are equal be-
" tween themselves."

This observation will be found to hold in all immediate consequences whatsoever, insomuch, that they are in fact no more than enthymemes of hypothetical syllogisms. But then it is particular to them, that the ground on which the conclusion rests, namely its coherence with the minor, is of itself apparent, and seen immediately to flow from the rules and reasons of logic.

96 A sorites of plain simple syllogisms.

XIII. The next species of reasoning we shall take notice of here is what is commonly known by the name of a *sorites*. This is a way of arguing, in which a great number of propositions are so linked together, that the predicate of one becomes continually the subject of the next following, until at last a conclusion is formed, by bringing together the subject of the first proposition, and the predicate of the last. Of this kind is the following argument:

" God is omnipotent:
" An omnipotent Being can do every thing pos-
" sible:
" He that can do every thing possible, can do what-
" ever involves not a contradiction:
" Therefore God can do whatever involves not a
" contradiction."

This particular combination of propositions may be continued to any length we please without in the least weakening the ground upon which the conclusion rests. The reason is, because the sorites itself may be resolved into as many simple syllogisms as there are middle terms in it; where this is found universally to hold, that when such a resolution is made, and the syllogisms are placed in train, the conclusion of the last in the series is also the conclusion of the sorites. This kind of argument, therefore, as it serves to unite several syllogisms into one, must stand upon the same foundation with the syllogisms of which it consists, and is indeed, properly speaking, no other than a compendious way of reasoning syllogistically.

97 A sorites of hypothetical syllogisms.

XIV. What is here said of plain simple propositions may be as well applied to those that are conditional; that is, any number of them may be so joined together in a series, that the consequent of one shall become continually the antecedent of the next following; in which case, by establishing the antecedent of the first proposition, we establish the consequent of the last, or by removing the last consequent remove also the first antecedent. This way of reasoning is exemplified in the following argument:

" If we love any person, all emotions of hatred to-
" wards him cease:
" If all emotions of hatred towards a person cease,
" we cannot rejoice in his misfortunes:
" If we rejoice not in his misfortunes, we certainly
" wish him no injury:
" Therefore, if we love a person, we wish him no
" injury."

It is evident that this sorites, as well as the last, may be resolved into a series of distinct syllogisms, with this only difference, that here the syllogisms are all conditional.

98 The ground of argumentation in a dilemma.

XV. The last species of syllogism we shall take notice of in this chapter is that commonly distinguished by the name of a *dilemma*. A dilemma is an argument by which we endeavour to prove the absurdity or falsehood of some assertion. In order to this, we assume a conditional proposition, the antecedent of which is the assertion to be disproved, and the consequent a disjunctive proposition, enumerating all the possible suppositions upon which that assertion can take place. If then it appears, that all these several suppositions ought to be rejected, it is plain that the antecedent or assertion itself must be so too. When therefore such a proposition as that before mentioned is made the major of any syllogism; if the minor rejects all the suppositions contained in the consequent, it follows necessarily, that the conclusion ought to reject the antecedent, which, as we have said, is the very assertion to be disproved. This particular way of arguing is that which logicians call a *dilemma*; and from the account here given of it, it appears that we may in the general define it to be a hypothetical syllogism, where the consequent of the major is a disjunctive proposition, which is wholly taken away or removed in the minor. Of this kind is the following:

" If God did not create the world perfect in its
" kind, it must either proceed from want of incli-
" nation, or from want of power:
" But it could not proceed either from want of in-
" clination, or from want of power:
" Therefore, he created the world perfect in its
" kind."

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"kind." Or, which is the same thing: "It is "absurd to say that he did not create the world "perfect in its kind."

99 An universal description of it.

XVI. The nature then of a dilemma is universally this. The major is a conditional proposition, whose consequent contains all the several suppositions upon which the antecedent can take place. As therefore these suppositions are wholly removed in the minor, it is evident that the antecedent must be so too; insomuch that we here always argue from the removal of the consequent to the removal of the antecedent. That is, a dilemma is an argument in the *modus tollens* of hypothetical syllogisms, as logicians love to speak. Hence it is plain, that if the antecedent of the major is an affirmative proposition, the conclusion of the dilemma will be negative; but if it is a negative proposition, the conclusion will be affirmative.

Chap. V. *Of Induction.*

100 Reason at first employed about particulars;

I. All reasoning proceeds ultimately from first truths, either self-evident or taken for granted; and the first truths of syllogistic reasonings are *general* propositions. But except in the mathematics, and such other sciences as, being conversant about mere ideas, have no immediate relation to things without the mind, we cannot assume as truths propositions which are general. The mathematician indeed may be considered as taking his ideas from the beginning in their *general* form. Every *proposition* composed of such ideas is therefore general; and those which are theoretic are reducible to two parts or *terms*, a *predicate* and a *subject*, with a *copula* generally affirmative. If the agreement or the relation between the two terms be not immediate and self-evident, he has recourse to an *axiom*, which is a proposition still *more general*, and which supplies him with a third or *middle term*. This he compares first with the *predicate*, and then with the *subject*, or *vice versa*. These two comparisons, when drawn out in form, make two propositions, which are called the *premises;* and if they happen to be *immediate* and *self-evident*, the *conclusion*, consisting of the terms of the question proposed, is said to be demonstrated. This method of reasoning is conducted exactly in the syllogistic form explained in the preceding chapter.

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II. But in sciences which treat of things external to the mind, we cannot assume as *first principles* the most general propositions, and from them infer others less and less general till we descend to particulars. The reason is obvious. Every thing in the universe, whether of mind or body, presents itself to our observation in its individual state; so that *perception* and *judgment* employed in the investigation of truth, whether *physical*, *metaphysical*, *moral*, or *historical*, have in the first place to encounter with particulars. "With these reason begins, or should begin, its operations. It observes, tries, canvasses, examines, and compares them together, and judges of them by some of those native evidences and original lights, which, as they are the first and indispensable inlets of knowledge to the mind, have been called the *primary principles of truth.*" See Metaphysics.

101 from which, by *induction*, it ascends to generals or axioms.

III. "By such acts of observation and judgment, diligently practised and frequently repeated, on many *individuals* of the same class or of a similar nature, noting their agreements, marking their differences however minute, and rejecting all instances which, however similar in appearance, are not in effect the same, reason, with much labour and attention, extracts some *general laws* respecting the powers, properties, qualities, actions, passions, virtues, and relations of *real things*. This is no hasty, premature, *notional* abstraction of the mind, by which images and ideas are formed that have no archetypes in nature: it is a rational, operative, experimental process, instituted and executed upon the constitution of beings, which in part compose the universe. By this process reason advances from *particulars* to *generals*, from *less general* to *more general*, till by a series of slow progression, and by regular degrees, it arrive at the *most general* notions, called forms or formal causes (c). And by *affirming* or *denying* a genus of a species, or an accident of a substance or class of substances, through all the stages of the gradation, we form *conclusions*, which, if logically drawn, are axioms (d), or general propositions ranged one above another,

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(c) Qui Formas novit, is, quæ adhuc non facta sunt, qualia nec naturæ vicissitudines, nec experimentales industriæ unquam in actum produxissent, nec cogitationem humanam subituræ fuissent, detegit et edueit. *Baconi Nov. Org.*

(d) The word axiom, αξιωμα, literally signifies *dignity:* Hence it is used metaphorically to denote a *general truth* or maxim, and sometimes any truth that is self-evident, which is called a *dignity* on account of its importance in a process of reasoning. The axioms of Euclid are propositions extremely general; and so are the axioms of the Newtonian philosophy. But these two kinds of axioms have very different origins. The former appear true upon a bare contemplation of our ideas; whereas the latter are the result of the most laborious induction. Lord Bacon therefore strenuously contends that they should never be taken upon conjecture, or even upon the authority of the learned; but that, as they are the general principles and grounds of all learning, they should be canvassed and examined with the most scrupulous attention, "ut axiomatum corrigatur iniquitas, quæ plerunique in exemplis vulgatis fundamentum habent:" *De Augm. Sc.* lib. ii. cap. 2. "Atque illa ipsa putativa principia ad rationes reddendas compellare decrevimus, quousque planè constant:" *Distrib. Operis.*——Dr Tatham makes a distinction between axioms *intuitive* and axioms *self-evident. Intuitive* axioms, according to him, pass through the first inlets of knowledge, and flash direct conviction on the minds, as external objects do on the senses, of all men. Other axioms, though not intuitive, may be properly said to be *self-evident;* because, in their formation, reason judges by single comparisons without the help of a third idea or middle term; so that they have their evidence in themselves, and though inductively framed they cannot be syllogistically proved. If this distinction be just, and we think it is, only *particular* truths can be intuitive axioms.

another, till they terminate in those that are UNIVERSAL.

102 The process of induction exemplified in physics.

IV. "Thus, for instance, *the evidence of the external senses* is obviously the PRIMARY PRINCIPLE from which all physical knowledge is derived. But, whereas nature begins with *causes*, which, after a variety of changes, produce *effects*, the senses open upon the *effects*, and from them, through the slow and painful road of experiment and observation, ascend to *causes*. By *experiments* and *observations* skilfully chosen, artfully conducted, and judiciously applied, the philosopher advances from one stage of inquiry to another in the rational investigation of the *general causes* of physical truth. From different experiments and observations made on the same individual subject, and from the same experiments and observations made on different subjects of the same kind, by comparing and judging, he discovers some *qualities*, *causes*, or *phenomena*, which, after carefully distinguishing and rejecting all contradictory instances that occur, he finds common to *many*. Thus from many collateral comparisons and judgments formed upon *particulars* he ascends to *generals;* and by a repetition of the same industrious process and laborious investigation, he advances from *general* to *more general*, till at last he is enabled to form a few of the *most general*, with their attributes and operations, into AXIOMS or *secondary principles*, which are the well-founded *laws* enacted and enforced by the God of nature.—This is that just and philosophic method of reasoning which sound logic prescribes in this as well as in other parts of learning; by which, through the slow but certain road of experiment and observation, the mind ascends from appearances to qualities, from effects to causes; and from experiments upon many particular subjects forms *general propositions* concerning the powers and properties of physical body.

103 Axioms so established applicable to all parts of learning.

V. "AXIOMS so investigated and established are applicable to all parts of learning, and are the indispensable, and indeed the wonderful expedients, by which, in every branch of knowledge, reason pushes on its inquiries in the particular pursuit of truth; and the method of reasoning by which they are formed, is that of true and legitimate INDUCTION; which is therefore by Lord Bacon, the best and soundest of logicians, called the *key of interpretation*.

VI. "Instead of taking his axioms arbitrarily out of the great families of the categories (see CATEGORY), and erecting them by his own sophistical invention into the principles upon which his disputation was to be employed, had the analytical genius of Aristotle presented us with the laws of the true INDUCTIVE LOGIC, by which AXIOMS are philosophically formed, and had he with his usual sagacity given us an example of it in a single branch of science; he would have brought to the temple of truth, an offering more valuable than he has done by the aggregate of all his logic and philosophical productions.

104 Induction prior to definition,

VII. "In all sciences, except the mathematics, it is only after the INDUCTIVE process has been industriously pursued and successfully performed, that DEFINITION may be logically and usefully introduced, by beginning with the *genus*, passing through all the graduate and subordinate stages, and marking the *specific difference* as it descends, till it arrive at the *individual*, which is the subject of the question. And by adding an *affirmation* or *negation* of the attribute of the *genus* or the *species* or *individual*, or of a general *accident* on the particular *substance* so defined, making the definition a proposition, the truth of the question will be logically solved without any farther process. So that instead of being the *first*, as employed by the logic in common use, *definition* may be the *last* act of reason in the search of truth in general.

105 and to syllogism.

VIII. "These AXIOMS or general propositions, thus *inductively* established, become another species of PRINCIPLES, which may be properly called SECONDARY, and which lay the foundation of the syllogistic method of reasoning. When these are formed, but not before, we may safely admit the maxim with which logicians set out in the exercise of their art, as the great hinge on which their reasoning and disputation turn: *From truths that are already known, to derive others which are not known.* Or, to state it more comprehensively, so as to apply to probable as well as to scientific reasoning—*From truths which are better known, to derive others which are less known.* Philosophically speaking, syllogistic reasoning is, under *general propositions* to reduce others which are *less general* or which are *particular;* for the *inferior* ones are known to be true, only as we trace their connexion with the *superior*. Logically speaking, it is, To predicate a *genus* of a *species* or *individual* comprehended under it, or an *accident* of the *substance* in which it is inherent.

106 Induction and syllogism totally different.

IX. "Thus INDUCTION and SYLLOGISM are the two methods of *direct reasoning* corresponding to the two kinds of principles, *primary* and *secondary*, on which they are founded, and by which they are respectively conducted. In both methods, indeed, reason proceeds by *judging* and *comparing*, but the process is different throughout; and though it may have the sanction of Aristotle, an *inductive syllogism* is a solecism.

107 Induction the foundation of syllogism.

X. "Till general truths are ascertained by induction, the *third* or *middle terms*, by which syllogisms are made are nowhere safely to be found. So that another position of the Stagyrite, *that syllogism is naturally prior in order to induction*, is equally unfounded; for *induction* does not only naturally but necessarily precede *syllogism;* and, except in mathematics, is in every respect indispensable to its existence; since, till generals are established, there can be neither *definition*, *proposition*, nor *axiom*, and of course no syllogism. And as induction is the first, so is it the more *essential* and fundamental instrument of reasoning: for as syllogism cannot produce its own *principles*, it must have them from induction; and if the general propositions or secondary principles be imperfectly or infirmly established, and much more if they be taken at hazard, upon authority, or by arbitrary assumption like those of Aristotle, all the syllogizing in the world is a vain and useless logomachy, only instrumental to the multiplication of false-learning, and to the invention and confirmation of error. The truth of syllogisms depends ultimately on the truth of axioms, and the truth of axioms on the soundness of inductions (E)."—But though induction is

(E) This chapter is almost wholly taken from *Tatham's Chart and Scale of Truth;* a work which, notwithstanding

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prior in order, as well as superior in utility, to syllogism, we have thought it expedient to treat of it last; both because syllogism is an easier exercise of the reasoning faculty than induction, and because it is the method of mathematics, the first science of reason in which the student is commonly initiated.

108 Why we have treated of syllogism first.

Chap. VI. *Of Demonstration.*

I. Having dispatched what seemed necessary to be said with regard to the two methods of direct reasoning, *induction* and *syllogism;* we now proceed to consider the laws of demonstration. And here it must be acknowledged, that in strict demonstration, which removes from the mind all possibility of doubt or error, the inductive method of reasoning can have no place. When the experiments and observations from which the general conclusion is drawn are numerous and extensive, the result of this mode of reasoning is moral certainty; and could the induction be made complete, it would be absolute certainty, equally convincing with mathematical demonstration. But however numerous and extensive the observations and experiments may be upon which an inductive conclusion is established, they must of necessity come short of the number and extent of nature; which, in some cases, by its immensity, will defeat all possibility of their co-extension; and in others, by its distance, lies out of the reach of their immediate application. Though truth does not appear in all other departments of learning with that bold and resistless conviction with which it presides in the mathematical science, it shines through them all, if not interrupted by prejudice or perverted by error, with a clear and useful, though inferior strength. And as it is not necessary for the general safety or convenience of a traveller, that he should always enjoy the heat and splendour of a mid-day sun, whilst he can with more ease pursue his journey under the weaker influence of a morning or an evening ray; so it is not requisite, for the various concerns and purposes of life, that men should be led by truth of the most redundant brightness. Such truth is to be had only in those sciences which are conversant about ideas and their various relations; where every thing being certainly what it appears to be, definitions and axioms arise from mere intuition. Here *syllogism* takes up the process from the beginning; and by a sublime intellectual motion advances from the simplest axioms to the most complicated speculations, and exhibits truth springing out of its first and purest elements, and spreading on all sides into a system of science. As each step in the progress is syllogistic, we shall endeavour to explain the use and application of syllogisms in this species of reasoning.

109 Of reasoning by a concatenation of syllogisms.

We have seen, that in all the different appearances they put on, we still arrive at a just and legitimate conclusion; now it often happens, that the conclusion of one syllogism becomes a previous proposition in another; by which means great numbers of them are sometimes linked together in a series, and truths are made to follow one another in a train. And as in such a concatenation of syllogisms all the various ways of reasoning that are truly conclusive may be with safety introduced; hence it is plain, that in deducing any truth from its first principles, especially where it lies at a considerable distance from them, we are at liberty to combine all the several kinds of syllogisms above explained, according as they are found best to suit the end and purpose of our inquiries. When a proposition is thus, by means of syllogisms, collected from others more evident and known, it is said to be *proved;* so that we may in the general define the proof of a proposition to be a syllogism, or series of syllogisms, collecting that proposition from known and evident truths. But more particularly, if the syllogisms of which the proofs consist admit of no premises but definitions, self-evident truths, and propositions already established, then is the argument so constituted called a *demonstration;* whereby it appears that demonstrations are ultimately founded on definitions and self-evident propositions.

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110 All syllogisms whatsoever reducible to the first figure.

II. All syllogisms whatsoever, whether compound, multiform, or defective, are reducible to plain simple syllogisms in some one of the four figures. But this is not all. Syllogisms of the first figure, in particular, admit of all possible conclusions: that is, any propositions whatsoever, whether an universal affirmative or universal negative, a particular affirmative or particular negative, which fourfold division embraces all their varieties; any one of these may be inferred by virtue of some syllogism in the first figure. By this means it happens that the syllogisms of all the other figures are reducible also to syllogisms of the first figure, and may be considered as standing on the same foundation with them. We cannot here demonstrate and explain the manner of this reduction, because it would too much swell the bulk of this treatise. It is enough to take notice that the thing is universally known and allowed among logicians, to whose writings we refer such as desire farther satisfaction in this matter. This then being laid down, it is plain that any demonstration whatsoever may be considered as composed of a series of syllogisms, all in the first figure. For, since all the syllogisms that enter the demonstration are reducible to syllogisms of some one of the four figures; and since the syllogisms of all the other figures are farther reducible to syllogisms of the first figure, it is evident that the whole demonstration may be resolved into a series of these last syllogisms. Let us now, if possible, discover the ground upon which the conclusion rests in syllogisms of the first figure; because, by so doing, we shall come at an universal principle of certainty, whence the evidence of all demonstrations in all their parts may be ultimately derived.

111 The ground of reasoning in the first figure.

III. The rules then of the first figure are briefly these. The middle term is the subject of the major proposition, and the predicate of the minor. The major is always an universal proposition and the minor always affirmative. Let us now see what effect these rules will have in reasoning. The major is an universal proposition of which the middle term is the subject,

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standing the ruggedness of its style, has so much real merit as a system of logic, that it cannot be too diligently studied by the young inquirer who wishes to travel by the straight road to the temple of Science.

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subject, and the predicate of the conclusion the predicate. Hence it appears, that in the major the predicate of the conclusion is always affirmed or denied universally of the middle term. Again, The minor is an affirmative proposition, whereof the subject of the conclusion is the subject, and the middle term the predicate. Here then the middle term is affirmed of the subject of the conclusion; that is, the subject of the conclusion is affirmed to be comprehended under, or to make a part of, the middle term. Thus then we see what is done in the premises of a syllogism of the first figure. The predicate of the conclusion is universally affirmed or denied of some idea. The subject of the conclusion is affirmed to be or to make a part of that idea. Hence it naturally and unavoidably follows, that the predicate of the conclusion ought to be affirmed or denied of the subject. To illustrate this by an example, we shall resume one of the syllogisms of the first chapter.

"Every creature possessed of reason and liberty is
"accountable for his actions:
"Man is a creature possessed of reason and liberty:
"Therefore man is accountable for his actions."

Here, in the first proposition, the predicate of the conclusion *accountableness*, is affirmed of all creatures that have reason and liberty. Again, In the second proposition, *man*, the subject of the conclusion, is affirmed to be or to make a part of this class of creatures. Hence the conclusion necessarily and unavoidably follows, viz. that man is accountable for his actions; because, if reason and liberty be that which constitutes a creature accountable, and man has reason and liberty, it is plain he has that which constitutes him accountable. In like manner, where the major is a negative proposition, or denies the predicate of the conclusion universally of the middle term, as the minor always asserts the subject of the conclusion to be or make a part of that middle term, it is no less evident that the predicate of the conclusion ought in this case to be denied of the subject. So that the ground of reasoning, in all syllogisms of the first figure, is manifestly this: "Whatever may be affirmed universally of any idea, may be affirmed of every or any number of particulars comprehended under that idea." And again: "Whatever may be denied universally of any idea, may be in like manner denied of every or any number of its individuals." These two propositions are called by logicians the *dictum de omni*, and *dictum de nullo*; and are indeed the great principles of syllogistic reasoning, inasmuch as all conclusions whatsoever rest immediately upon them, or upon propositions deduced from them. But what adds greatly to their value is, that they are really self-evident truths, and such as we cannot gainsay without running into an express contradiction. To affirm, for instance, that *no man is perfect*, and yet argue that *some men are perfect*; or to say that *all men are mortal*, and yet that *some men are not mortal*, is to assert a thing to be and not to be at the same time.

112 Demonstration an infallible guide to truth and certainty.

IV. And now we may affirm, that, in all syllogisms of the first figure, if the premises are true, the conclusion must needs be true. If it be true that the predicate of the conclusion, whether affirmative or negative, agree universally to some idea; and if it be also true that the subject of the conclusion is a part of or comprehended under that idea; then it necessarily follows, that the predicate of the conclusion agrees also to the subject. For to assert the contrary, would be to run counter to some one of the two principles before established; that is, it would be to maintain an evident contradiction. And thus we are come at last to the point we have been all along endeavouring to establish; namely, that every proposition which can be demonstrated is necessarily true. For as every demonstration may be resolved into a series of syllogisms all in the first figure; and as in any one of these syllogisms, if the premises are true, the conclusion must needs be so too; it evidently follows, that if all the several premises are true, all the several conclusions are so, and consequently the conclusion also of the last syllogism, which is always the proposition to be demonstrated. Now that all the premises of a demonstration are true, will easily appear from the very nature and definition of that form of reasoning. A demonstration, as we have said, is a series of syllogisms, all whose premises are either definitions, self-evident truths, or propositions already established. Definitions are identical propositions, wherein we connect the description of an idea with the name by which we choose to have that idea called, and therefore as to their truth there can be no dispute. Self-evident propositions appear true of themselves, and leave no doubt or uncertainty in the mind. Propositions, before established, are no other than conclusions gained by one or more steps from definitions and self-evident principles, that is, from true premises, and therefore must needs be true. Whence all the previous propositions of a demonstration being, we see, manifestly true; the last conclusion, or proposition to be demonstrated, must be so too. So that demonstration not only leads to certain truth, but we have here also a clear view of the ground and foundation of that certainty. For as, in demonstrating, we may be said to do nothing more than combine a series of syllogisms together, all resting on the same bottom; it is plain that one uniform ground of certainty runs through the whole, and that the conclusions are everywhere built upon some one of the two principles before established, as the foundation of all our reasoning. These two principles are easily reduced into one, and may be expressed thus: "Whatever predicate, whether affirmative or negative, agrees universally to any idea; the same must needs agree to every or any number of individuals comprehended under that idea." And thus at length we have, according to our first design, reduced the certainty of demonstration to one simple and universal principle; which carries its own evidence along with it, and which is indeed the ultimate foundation of all syllogistic reasoning.

113 The rules of logic furnish a sufficient criterion for distinguishing between truth and falsehood.

V. Demonstration therefore serving as an infallible guide to truth, and therefore on so sure and unalterable a basis, we may now venture to assert, that the rules of logic furnish a sufficient criterion for the distinguishing between truth and falsehood. For since every proposition that can be demonstrated is necessarily true, he is able to distinguish truth from falsehood who can with certainty judge when a proposition is truly demonstrated. Now, a demonstration is, as we have said, nothing more than a concatenation of syllogisms, all whose premises are definitions, self-evident

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evident truths, or propositions previously established. To judge therefore of the validity of a demonstration, we must be able to distinguish whether the definitions that enter it are genuine, and truly descriptive of the ideas they are meant to exhibit: whether the propositions assumed without proofs as intuitive truths have really that self-evidence to which they lay claim: whether the syllogisms are drawn up in due form, and agreeable to the laws of argumentation: in fine, whether they are combined together in a just and orderly manner, so that no demonstrable propositions serve anywhere as premises unless they are conclusions of previous syllogisms. Now, it is the business of logic, in explaining the several operations of the mind, fully to instruct us in all these points. It teaches the nature and end of definitions, and lays down the rules by which they ought to be framed. It unfolds the several species of propositions, and distinguishes the self-evident from the demonstrable. It delineates also the different forms of syllogisms, and explains the laws of argumentation proper to each. In fine, it describes the manner of combining syllogisms, so as that they may form a train of reasoning, and lead to the successive discovery of truth. The precepts of logic, therefore, as they enable us to judge with certainty when a proposition is duly demonstrated, furnish a sure criterion for the distinguishing between truth and falsehood.

114 and extending to all cases where a certain knowledge of truth is attainable.

VI. Perhaps it may be objected, that demonstration is a thing very rare and uncommon, as being the prerogative of but a few sciences, and therefore the criterion here given can be of no great use. But wherever, by the bare contemplation of our ideas, truth is discoverable, there also demonstration may be attained. Now that is an abundantly sufficient criterion which enables us to judge with certainty in all cases where the knowledge of truth comes within our reach; for with discoveries, that lie beyond the limits of the human mind, we have, properly, no business or concernment. When a proposition is demonstrated, we are certain of its truth. When, on the contrary, our ideas are such as have no visible connection or repugnance, and therefore furnish not the proper means of tracing their agreement or disagreement, there we are sure that scientifical knowledge is not attainable. But where there is some foundation of reasoning, which yet amounts not to the full evidence of demonstration, there the precepts of logic, by teaching us to determine aright of the degree of proof, and of what is still wanting to render it full and complete, enable us to make a due estimate of the measures of probability, and to proportion our assent to the grounds on which the proposition stands. And this is all we can possibly arrive at, or even so much as hope for, in the exercise of faculties so imperfect and limited as ours.

115 The distinction of demonstration into direct and indirect.

VII. Before we conclude this chapter, it may not be improper to take notice of the distinction of demonstration into *direct* and *indirect*. A *direct demonstration* is, when, beginning with definitions, self-evident propositions, or known and allowed truths, we form a train of syllogisms, and combine them in an orderly manner, continuing the series through a variety of successive steps, until at last we arrive at a syllogism whose conclusion is the proposition to be demonstrated. Proofs of this kind leave no doubt or uncertainty behind them; because, all the several premises being true, the conclusions must be so too, and of course the very last conclusion or proposition to be proved. The other species of demonstration is the *indirect*, or, as it is sometimes called, the *apogogical*. The manner of proceeding here is, by assuming a proposition which directly contradicts that we mean to demonstrate; and thence, by a continued train of reasoning, in the way of a direct demonstration, deducing some absurdity or manifest untruth. For hereupon we conclude, that the proposition assumed was false; and thence again, by an immediate consequence, that the proposition to be demonstrated is true. Thus Euclid, in his third book, being to demonstrate *that circles which touch one another inwardly have not the same centre*, assumes the direct contrary to this, viz. *that they have the same centre;* and thence, by an evident train of reasoning, proves *that a part is equal to the whole*. The supposition therefore leading to this absurdity he concludes to be false, viz. *that circles touching one another inwardly have the same centre;* and thence again immediately infers, *that they have not the same centre*.

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116 Ground of reasoning in indirect demonstrations.

VIII. Now, because this manner of demonstration is accounted by some not altogether so clear and satisfactory; we shall therefore endeavour to show, that it equally with the other leads to truth and certainty. Two propositions are said to be *contradictory* one of another, when that which is asserted to be in the one is asserted not to be in the other. Thus the propositions, *Circles that touch one another inwardly have the same centre*, and *Circles that touch one another inwardly have not the same centre*, are *contradictories*, because the second asserts the direct contrary of what is asserted in the first. Now, in all contradictory propositions, this holds universally, That one of them is necessarily true, and the other necessarily false. For if it be true, that circles which touch one another inwardly have not the same centre; it is unavoidably false that they have the same centre. On the other hand, if it be false that they have the same centre, it is necessarily true that they have not the same centre, Since therefore it is impossible for them to be both true or both false at the same time, it unavoidably follows, that one is necessarily true, and the other necessarily false. This then being allowed, which is indeed self-evident; if any two contradictory propositions are assumed, and one of them can by a clear train of reasoning be demonstrated to be false, it necessarily follows that the other is true. For as the one is necessarily true, and the other necessarily false; when we come to discover which is the false proposition, we thereby also know the other to be true.

117 Indirect demonstration a sure guide to certainty.

IX. Now this is precisely the manner of an indirect demonstration, as is evident from the account given of it above. For there we assume a proposition which directly contradicts that we mean to demonstrate; and, having by a continued series of proofs shown it to be false, thence infer that it is contradictory, or the proposition to be demonstrated is true. As, therefore, this last conclusion is certain and unavoidable, let us next inquire after what manner we come to be satisfied of the falsehood of the assumed proposition, that so no possible doubt may remain as to the force and validity of demonstration of this kind. The manner then is plainly this: Beginning with the assumed proposition,

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we, by the help of definitions, self-evident truths, or propositions already established, continue a series of reasoning, in the way of a direct demonstration, until at length we arrive at some absurdity or known falsehood. Thus Euclid, in the example before mentioned, from the supposition that circles touching one another inwardly have the same centre, deduces *that a part is equal to the whole*. Since, therefore, by a due and orderly process of reasoning, we come at last to a false conclusion; it is manifest, that all the premises cannot be true: for, were all the premises true, the last conclusion must be so too, by what has been before demonstrated. Now, as to all the other premises made use of in the course of reasoning, they are manifest and known truths by supposition, as being either definitions, self-evident propositions, or truths previously established. The assumed proposition is that only as to which any doubt or uncertainty remains. That alone, therefore, can be false; and indeed, from what has been already shown, must unavoidably be so. And thus we see, that in indirect demonstrations, two contradictory propositions being laid down, one of which is demonstrated to be false, the other, which is always the proposition to be proved, must necessarily be true; so that here, as well as in the direct way of proof, we arrive at a clear and satisfactory knowledge of truth.

115 A particular case of indirect demonstrations.

X. This is universally the method of reasoning in all apogogical or direct demonstrations. But if any proposition is assumed, from which, in a direct train of reasoning, we can deduce its contradictory; the proposition so assumed is false, and the contradictory one true. For if we suppose the assumed proposition to be true, then, since all the other premises that enter the demonstration are also true, we shall have a series of reasoning consisting wholly of true premises; whence the last conclusion or contradictory of the assumed proposition must be true likewise; so that by this means we should have two contradictory propositions both true at the same time, which is manifestly impossible. The assumed proposition, therefore, whence this absurdity flows, must necessarily be false; and consequently its contradictory, which is here the proposition deduced from it, must be true. If then any proposition is proposed to be demonstrated, and we *assume* the *contradictory* of that proposition, and thence directly infer the proposition to be demonstrated; by this very means we know that the proposition so inferred is true. For, since from an assumed proposition we have deduced its contradictory, we are thereby certain that the assumed proposition is false; and if so, then its contradictory, or that deduced from it, which in this case is the same with the proposition to be demonstrated, must be true.

XI. We have a curious instance of this in the twelfth proposition of the ninth book of the Elements. Euclid there proposes to demonstrate, *that in any series of numbers, rising from unity in geometrical progression, all the prime numbers that measure the last term in the series will also measure the next after unity.* In order to this, he assumes the contradictory of the proposition to be demonstrated; namely, *that some prime number measuring the last term in the series does not measure the next after unity;* and thence, by a continued train of reasoning, proves that it actually does measure it. Hereupon he concludes the assumed proposition to be false; and that which is deduced from it, or its contradictory, which is the very proposition he proposed to demonstrate, to be true. Now that this is a just and conclusive way of reasoning, is abundantly manifest from what we have so clearly established above. Whence it appears, how necessary some knowledge of the rules of logic is, to enable us to judge of the force, justness, and validity, of demonstrations. For, though it is readily allowed, that by the mere strength of our natural faculties we can at once discern, that of two contradictory propositions, the one is necessarily true, and the other necessarily false; yet when they are so linked together in a demonstration, as that the one serves as a previous proposition whence the other is deduced, it does not so immediately appear, without some knowledge of the principles of logic, why that alone, which is collected by reasoning, ought to be embraced as true, and the other, whence it is collected, to be rejected as false.

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119 A due knowledge of the principles of logic indispensably necessary to make us proper judges of demonstration;

120 and of itself sufficient to guard us against error and false reasoning.

XII. Having thus sufficiently evinced the certainty of demonstration in all its branches, and shown the rules by which we ought to proceed, in order to arrive at a just conclusion, according to the various ways of arguing made use of, it is needless to enter upon a particular consideration of those several species of false reasoning which logicians distinguish by the name of *sophisms*. He that thoroughly understands the form and structure of a good argument, will of himself readily discern every deviation from it. And although *sophisms* have been divided into many classes, which are all called by sounding names, that therefore carry in them much appearance of learning; yet are the errors themselves so very palpable and obvious, that it would be lost labour to write for a man capable of being misled by them. Here, therefore, we choose to conclude this part of logic: and shall in the next give some account of *Method*, which, though inseparable from reasoning, is nevertheless always considered by logicians as a distinct operation of the mind; because its influence is not confined to the mere exercise of the reasoning faculty, but extends in some degree to all the transactions of the understanding.

PART IV. OF METHOD.

121 The understanding sometimes employed in putting together known truths;

WE have now done with the three first operations of the mind, whose office it is to search after truth, and enlarge the bounds of human knowledge. There is yet a fourth, which regards the disposal and arrangement of our thoughts, when we endeavour so to put them together as that their mutual connexion and dependence may be clearly seen. This is what logicians called *Method*, and place always the last in order in explaining the powers of the understanding; because it necessarily supposes a previous exercise of our other faculties, and some progress made in knowledge before we can exert it in any extensive degree.

II. In

122 sometimes in the search and discovery of such as are unknown:

II. In this view, it is plain that we must be beforehand well acquainted with the truths we are to combine together; otherwise, how could we discern their several connections and relations, or so dispose of them as their mutual dependence may require? But it often happens, that the understanding is employed, not in the arrangement and composition of known truths, but in the search and discovery of such as are unknown. And here the manner of proceeding is very different. We assemble at once our whole stock of knowledge relating to any subject, and, after a general survey of things, begin with examining them separately and by parts. Hence it comes to pass, that whereas, at our first setting out, we were acquainted only with some of the grand strokes and outlines of truth; by thus pursuing her through her several windings and recesses, we gradually discover those more inward and finer touches whence she derives all her strength, symmetry, and beauty. And here it is, that when, by a narrow scrutiny into things, we have unravelled any part of knowledge, and traced it to its first and original principles, insomuch that the whole frame and contexture of it lies open to the view of the mind; here it is that, taking it the contrary way, and beginning with these principles, we can so adjust and put together the parts as the order and method of science require.

123 Illustrated by the similitude of a watch.

III. But as these things are best understood when illustrated by examples, let us suppose any machine, for instance a watch, presented to us, whose structure and composition we are as yet unacquainted with, but want, if possible, to discover. The manner of proceeding, in this case, is, by taking the whole to pieces, and examining the parts separately, one after another. When, by such a scrutiny, we have thoroughly informed ourselves of the frame and contexture of each, we then compare them together, in order to judge of their mutual action and influence. By this means we gradually trace out the inward make and composition of the whole, and come at length to discern how parts of such a form, and so put together as we found in unravelling and taking them asunder, constitute that particular machine called a *watch*, and contribute to all the several motions and phenomena observable in it. This discovery being made, we can take things the contrary way, and, beginning with the parts, so dispose and connect them as their several uses and structures require, until at length we arrive at the whole itself, from the unravelling of which those parts resulted.

124 Ground of the analytic and synthetic methods.

IV. And as it is in tracing and examining the works of art; so is it, in a great measure, in unfolding any part of human knowledge: for the relations and mutual habitudes of things do not always immediately appear upon comparing them one with another. Hence we have recourse to intermediate ideas; and, by means of them, are furnished with those previous propositions that lead to the conclusion we are in quest of. And if it so happens that the previous propositions themselves are not sufficiently evident, we endeavour, by new middle terms, to ascertain their truth; still tracing things backward, in a continual series, until at length we arrive at some syllogism where the premises are first and self-evident principles. This done, we become perfectly satisfied as to the truth of all the conclusions we have passed through, inasmuch as they are now seen to stand upon the firm and immoveable foundation of our intuitive perceptions. And as we arrived at this certainty by tracing things backward to the original principles whence they flow; so may we at any time renew it by a direct contrary process, if, beginning with these principles, we carry the train of our thoughts forward, until they lead us, by a connected chain of proofs, to the very last conclusion of the series.

125 Division of method into analytic and synthetic.

V. Hence it appears, that, in disposing and putting together our thoughts, either for our own use, that the discoveries we have made may at all times lie open to the review of the mind, or where we mean to communicate and unfold the discoveries to others, there are two ways of proceeding equally within our choice: for we may so propose the truths relating to any part of knowledge, as they presented themselves to the mind in the manner of investigation; carrying on the series of proofs, in a reverse order, until they at last terminate in first principles: or, beginning with these principles, we may take the contrary way, and from them deduce, by a direct train of reasoning, all the several propositions we want to establish. This diversity in the manner of arranging our thoughts gives rise to the twofold division of method established among logicians: for method, according to their use of the word, is nothing else but the order and disposition of our thoughts relating to any subject. When truths are so proposed and put together as they were or might have been discovered, this is called the *analytic method*, or the *method of resolution;* inasmuch as it traces things backward to their source, and resolves knowledge into its first and original principles. When, on the other hand, they are deduced from these principles, and connected according to their mutual dependence, insomuch that the truths first in order tend always to the demonstration of those that follow; this constitutes what we call the *synthetic method*, or *method of composition*. For here we proceed by gathering together the several scattered parts of knowledge, and combining them into one whole or system, in such manner that the understanding is enabled distinctly to follow truth through all her different stages and gradations.

126 Called otherwise the method of invention, and the method of science.

VI. There is this farther to be taken notice of, in relation to these two species of method; that the first has also obtained the name of the *method of invention*, because it observes the order in which our thoughts succeed one another in the invention or discovery of truth. The other, again, is often denominated the *method of doctrine* or *instruction;* inasmuch as in laying our thoughts before others, we generally choose to proceed in the synthetic manner, deducing them from their first principles. For we are to observe, that although there is great pleasure in pursuing truth in the method of investigation, because it places us in the condition of the inventor, and shows the particular train and process of thinking by which he arrived at his discoveries; yet it is not so well accommodated to the purposes of evidence and conviction. For, at our first setting out, we are commonly unable to divine where the analysis will lead us; insomuch that our researches are for some time little better than a mere groping in the dark. And even after light begins to break in upon us, we are still obliged to many reviews,

and

Of Method. and a frequent comparison of the several steps of the investigation among themselves. Nay, when we have unravelled the whole, and reached the very foundation on which our discoveries stand, all our certainty, in regard to their truth, will be found in a great measure to arise from that connexion we are now able to discern between them and first principles, taken in the order of composition. But in the synthetic manner of disposing our thoughts, the case is quite different: for as we here begin with the intuitive truths, and advance by regular deductions from them, every step of the procedure brings evidence and conviction along with it; so that, in our progress from one part of knowledge to another, we have always a clear perception of the ground on which our assent rests. In communicating therefore our discoveries to others, this method is apparently to be chosen, as it wonderfully improves and enlightens the understanding, and leads to an immediate perception of truth.

VII. The logic which for so many ages kept possession of the schools, and was deemed the most important of the sciences, has long been condemned as a mere art of wrangling, of very little use in the pursuit of truth. Attempts have been made to restore it to credit, but without success; and of late years little or no attention whatever has been paid to *the art of reasoning* in the course of what is called a liberal education. As both extremes may be faulty, it should seem that we cannot conclude this short treatise more properly than with the following

Reflections on the Utility of Logic.

If Aristotle was not the inventor of logic, he was certainly the prince of logicians. The whole theory of syllogisms he claims as his own, and as the fruit of much time and labour; and it is universally known, that the later writers on the art have borrowed their materials almost entirely from his Organon and Porphyry's Introduction. But after men had laboured near 2000 years in search of truth by the help of syllogisms, Lord Bacon proposed the method of induction, as a more effectual engine for that purpose; and since his days the art of logic has gradually fallen into disrepute.

To this consequence many causes contributed. The art of syllogism is admirably calculated for wrangling; and by the schoolmen it was employed with too much success, to keep in countenance the absurdities of the Romish church. Under their management it produced numberless disputes, and numberless sects, who fought against each other with much animosity without gaining or losing ground; but it did nothing considerable for the benefit of human life, whilst the method of induction has improved arts and increased knowledge. It is no wonder, therefore, that the excessive admiration of Aristotle, which continued for so many ages, should end in an undue contempt: and that the high esteem of logic, as the grand engine of science, should at last make way for too unfavourable an opinion, which seems now prevalent, of its being unworthy of a place in a liberal education. Men rarely leave one extreme without running into the contrary: Those who think according to the fashion, will be as prone to go into the present extreme as their grandfathers were to go into the former; and even they who in *general* think for themselves, when they are offended at the abuse of any thing, are too apt to entertain prejudices against the *thing itself*. "In practice (says the learned Warburton *), logic is more a *trick* than a *science*, formed rather to amuse than to instruct. And in some sort we may apply to the art of syllogism what a man of wit says of rhetoric, that it only tells us how to *name* those tools which nature had before put into our hands. In the service of chicane, indeed, it is a mere juggler's knot, now fast, now loose; and the schools where this legerdemain was exercised in great perfection are full of the stories of its wonders." The authority of Warburton is great; but it may be counterbalanced by another, which, on subjects of this nature, is confessedly greater.

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* *Introduction to Julian, &c.*

"Laying aside prejudice, whether fashionable or unfashionable, let us consider (says Dr Reid †) whether logic is or may be made subservient to any good purpose. Its professed end is, to teach men to think, to judge, and to reason, with precision and accuracy. No man will say this is a matter of little importance: the only thing therefore that can admit of doubt is, whether it can be taught?

† *Appendix to Lord Kames's Sketch on the Principles and Progress of Reason.*

"To resolve this doubt, it may be observed, that our rational faculty is the gift of God, given to men in very different measures: Some have a large portion, some a less; and where there is a remarkable defect of the natural power, it cannot be supplied by any culture. But this natural power, even where it is the strongest, may lie dead for want of the means of improvement. Many a savage may have been born with as good faculties as a *Newton*, a *Bacon*, or an *Aristotle;* but their talents were buried by having never been put to use, whilst those of the philosophers were cultivated to the best advantage. It may likewise be observed, that the chief mean of improving our rational power, is the vigorous exercise of it in various ways and on different subjects, by which the habit is acquired of exercising it properly. Without such exercise, and good sense over and above, a man who has studied logic all his life may be only a petulant wrangler, without true judgment or skill of reasoning in any science."

This must have been Locke's meaning, when in his Thoughts on Education, he says, "If you would have your son to reason well, let him read Chillingworth." The state of things is much altered since Locke wrote: Logic has been much improved chiefly by his writings; and yet much less stress is laid upon it, and less time consumed in its study. His counsel, therefore, was judicious and seasonable; to wit, That the improvement of our reasoning power is to be expected much more from an intimate acquaintance with the authors who reason best, than from studying voluminous systems of school logic. But if he had meant, that the study of logic was of no use, nor deserved any attention, he surely would not have taken the pains to make so considerable an addition to it, by his *Essay on the Human Understanding*, and by his *Thoughts on the conduct of the Understanding;* nor would he have remitted his pupil to *Chillingworth*, the acutest logician as well as the best reasoner of his age."

There is no study better fitted to exercise and strengthen the reasoning powers than that of the mathematical sciences; because there is no other branch

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of science which gives such scope to long and accurate trains of reasoning, or in which there is so little room for authority or prejudice of any kind to give a false bias to the judgment. When a youth of moderate parts begins to study Euclid, every thing is new to him: His apprehension is unsteady; his judgment is feeble; and rests partly upon the evidence of the thing, and partly upon the authority of his teacher. But every time he goes over the definitions, the axioms, the elementary propositions, more light breaks in upon him; and as he advances, the road of demonstration becomes smooth and easy; he can walk in it firmly, and take wider steps, till at last he acquires the habit not only of understanding a demonstration, but of discovering and demonstrating mathematical truths.

It must indeed be confessed, that a man without the rules of logic may acquire a habit of reasoning justly in *mathematics*, and perhaps in any other science. Good sense, good examples, and assiduous exercise, may bring a man to reason justly and acutely in his own profession without rules. But whoever thinks, that from this concession he may infer the inutility of logic, betrays by this inference a great want of that art; for he might as well infer, because a man *may* go from Edinburgh to London by the way of Paris, that therefore *any other* road is useless.

There is perhaps no art which may not be acquired, in a very considerable degree, by example and practice, without reducing it to rules. But practice joined with rules may carry a man forward in his art farther and more quickly than practice without rules.—Every ingenious artist knows the utility of having his art reduced to rules, and thereby made a science. By rules he is enlightened in his practice, and works with more assurance. They enable him sometimes to correct his own errors, and often to detect the errors of others; and he finds them of great use to confirm his judgment, to justify what is right, and to condemn what is wrong. Now mathematics are the noblest *praxis* of *logic*. Through them we may perceive how the stated forms of syllogism are exemplified in one subject, namely the predicament of quantity; and by marking the force of these forms, as they are there applied, we may be enabled to apply them of ourselves elsewhere. Whoever, therefore, will study mathematics with this view, will become not only by mathematics a more expert *logician*, and by logic a more rational *mathematician*, but a wiser philosopher, and an acuter reasoner, in all the possible subjects either of science or deliberation. But when mathematics, instead of being applied to this excellent purpose, are used not to exemplify logic, but to supply its place, no wonder if logic fall into contempt; and if mathematics, instead of furthering science, become in fact an obstacle. For when men, knowing nothing of that reasoning which is *universal*, come to attach themselves for years to a *single species*, a species wholly involved in *lines* and *numbers*, the mind becomes incapacitated for reasoning at large, and especially in the search of *moral truth*. The object of mathematics is *demonstration*; and whatever in that science is not demonstration, is nothing, or at least below the sublime inquirer's regard. *Probability*, through its almost infinite degrees, from simple ignorance up to absolute certainty, is the *terra incognita* of the mathematician. And yet here it is that the great *business* of the human mind is carried on in the search and discovery of all the important truths which concern us as reasonable beings. And here too it is that all its *vigour* is exerted: for to proportion the assent to the probability accompanying every varying degree of moral evidence, requires the most enlarged and sovereign exercise of reason.

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In reasonings of this kind, will any man pretend that it is of no use to be well acquainted with the various powers of the mind by which we reason? Is it of no use to resolve the various kinds of reasoning into their simple elements; and to discover, as far as we are able, the rules by which these elements are combined in judging and in reasoning? Is it of no use to mark the various fallacies in reasoning, by which even the most ingenious men have been led into error? It must surely betray great want of understanding to think these things useless or unimportant. Now these are the things which logicians have attempted; and which they have executed—not indeed so completely as to leave no room for improvement, but in such a manner as to give very considerable aid to our reasoning powers. That the principles they have laid down with regard to definition and division, with regard to the conversion and opposition of propositions, and the general rules of reasoning, are not without use, is sufficiently apparent from the blunders committed daily by those who disdain any acquaintance with them.

Although the art of categorical syllogism is confessedly little fitted for the discovery of unknown truth, it may yet be employed to excellent purposes, as it is perhaps the most compendious method of detecting a fallacy. A man in quest of unknown truths must generally proceed by the way of induction, from effects to causes; but he who as a teacher is to inculcate any system upon others, begins with one or more self-evident truths, and proceeds in the way of demonstration, to the conclusion which he wishes to establish. Now every demonstration, as has been already observed, may be resolved into a series of syllogisms, of which the conclusion of the preceding always enters into the premises of that which follows: and if the first principles be clear and evident, and every syllogism in some legitimate mode and figure, the conclusion of the whole must infallibly be admitted. But when the demonstration is thus broken into parts; if we find that the conclusion of one syllogism will not, without altering the meaning of the terms, enter legitimately into the premises of that which should immediately follow; or, supposing it to make one of the premises of a *new* syllogism, if we find that the conclusion resulting from the whole series *thus* obtained, is different from that of the demonstration; we may, in either of these cases, rest assured that the author's reasoning is fallacious, and leads to error; and that if it carried an appearance of conviction before it was thus resolved into its elementary parts, it must have been owing to the inability of the mind to comprehend at *once* a long train of arguments. Whoever wishes to see the syllogistic art employed for this purpose, and to be convinced of the truth of what we have said respecting its utility, may consult the excellent writer recommended by Locke, who, in places innumerable of his incomparable book, has, without pedantry, even in that pedantic age, made the happiest application of the rules

of

Of Method. of logic for unravelling the sophistry of his Jesuitical antagonist.

Upon the whole, then, though we readily acknowledge that much time was wasted by our forefathers in syllogistic wrangling, and what might with little impropriety be termed the *mechanical* part of logic; yet the art of forming and examining arguments is certainly an attainment not unworthy the ambition of that being whose highest honour is to be endued with reason. Of Method.

LOG

Logistæ, Logography. LOGISTÆ, certain officers at Athens, in number ten, whose business consisted in receiving and passing the accounts of magistrates when they went out of office. The *logistæ* were elected by lot, and had ten *euthyni* or auditors of accounts under them.

LOGOGRAPHY, a new method of printing, in which the types, instead of answering only to single letters, are made to correspond to whole words.

This method, though seemingly a retrograde procession in the printing art, has lately obtained the sanction of his majesty's patent, and has for some time been actually put in execution in the way of trade, apparently with advantage to the proprietors. In the year 1783, a treatise upon this subject appeared by Henry Johnson, in which the origin as well as the utility of the art are fully laid down, and the matter set forth in such a light as can scarce allow us to doubt that it is an improvement in the art. Mr Johnson informs us, that about five years before, viz. in the year 1778, intending to publish a daily list of blanks and prizes in the lottery numerically arranged, he found it could not be accomplished in time by the ordinary way of printing. On this account he procured types of two, three, or more figures as was necessary for this purpose; and thus any entire number might as readily be taken up as if it had been a single type. His next attempt was in forming some large mercantile tables of pounds, shillings, pence, and farthings. For these he procured types expressive of any sum of money ready composed and united, "by which (says he) every species of figure-printing could be performed for the tenth part of the cost, printers always charging it double the price of letter-printing." Having thus succeeded to his wish in his two first attempts, he next began to consider if the method could not be applied to words; and in this also the success was equal.

The properties of the logographic art according to our author, are, 1. That the compositor shall have less charged upon his memory than in the common way. 2. It is much less liable to error. 3. The type of each word is as easily laid hold of as that of a single letter. 4. The decomposition is much more readily performed, even by the merest novices, than they now decompose letters. 5. No extraordinary expence nor greater number of types is required in the logographic than in the common method of printing.

The first of these positions is proved by our author in the following manner. In the common method, the compositor has 150 divisions to which there is no reference, and the printing offices are not agreed with respect to the mode of placing their boxes; "but under this improvement he has only to know the letters of the alphabet, and is assisted with an index

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of them, insomuch that the simplicity of the latter apparatus enables him, by a little practice, to lay his finger almost blindfold on the word required; and the meanest capacity is equal to this mental exercise, having little more to do than knowing by inspection the difference between words under three and those above three syllables; and all the apparatus being within a compass not a great deal more extended than common printing, for these reasons he is as soon possessed of his type of a word as they are of a single letter." Logography.

Thus the first and third positions may be said to be proved; but in his proof of the second, our author himself shows that his art is not infallible, by substituting the word *third* instead of *second*. Substitutions of this kind, he owns, may readily take place; but such errors are much more conspicuous than literal ones, though they may be corrected with equal ease; "for the erroneous substitution cannot fail of being nearly equal in length to the word required; although, even otherwise, it would not be attended with greater disadvantage than in the common way, and it would be rectified with greater facility."

The ease with which the composition is performed, shows that there must be an equal ease in performing the decomposition; "from whence (says Mr Johnson) it is further demonstrable, that any work can be composed by this method nearly as soon as it can be deliberately read; and as to the fifth position, that it shall not require a greater expence of types, it is answered, that it is impossible for more types of letters to be wanted for this method than by any other printer according to the equal quantity of business to be performed, every office having certain known quantities of each letter called a *fount*. A printer's fount contains about 92,500 letters, and our want is not more; nay, nearer the truth, the present quantity for a fount containing much more of some letters than necessary, and fewer of others; which arises from the calculation of the quantity of each letter wanted being adhered to since the old spelling."

Our author now proceeds to demonstrate that the number of types must necessarily decrease as they are combined in syllables, and much more when formed into words. The whole art of arranging the words consists in placing them under as few divisions as possible, and still fewer subdivisions; which is attained by the following process.

1. A collection of words, with the addition of tenses, plurals, and degrees of comparison amounting to more than 100,000, was made from the best English dictionaries:

2. Collections were made from the miscellaneous part

Logography. of 20 newspapers, the Spectator, and Common Prayer-book. The method was, by procuring duplicates of every sheet, so that each alternate side might be pasted over with white paper, in order to leave the whole of the words on both sides perfect; and thus the whole might be touched with less danger of injury than otherwise could have been done. The confusion arising from the parts of other words being seen from the opposite side was likewise prevented.

3. The words, being separately cut out, were then put into a case marked with the divisions from one to 16, according to the number of letters contained in each word. Thus several letters were distinctly collected; and then each separate parcel sorted in a case containing 26 divisions, marked with the letters of the alphabet, according to the commencing letter of the word; and thus all the words were ranged alphabetically, consisting of two, three, four, or five letters, in separate parcels.

4. The same words were then placed together, and posted into an alphabet, with the number of times marked to each that had occurred on the whole; that in this manner a proportion might be determined how many times particular words ought to be repeated for the printing of one sheet, and also to know what words are in general use: There are likewise a number of technical terms, and favourite phrases, a great number of times repeated almost by every author; but though these occur throughout the whole book in great proportion to the rest, no more of them will be necessary than what suffice for a single sheet.

5. The whole of the above might be done without the trouble just mentioned, by posting every word at once into a triformed alphabet; because the subdivisions of the second and third commencing letter of each word for references are now obtained, and thus can easily be placed in its proper division, and may be marked as often as it occurs, without repeating the same word; whence we plainly see the ease and expedition of it, from the facility and expedition of posting every word from a leaf in any book. Before such subdivisions were known, they could only have been placed under the first commencing letter of the word; which would cause such a multiplicity of repetitions, that it would take up more time, be far more liable to error, and require more subordinate postings to bring them into arrangement; so that they may be found more easily than by the above proceedings. Thus also a collection will be obtained of single and double words, which are constantly required from 20 to 400 or 500 times in the printing one sheet of any work whatever; and which alone would abridge the compositor's work near one-third. This second process likewise enabled the author to reject, out of the first collection, obsolete words, technical terms, &c. which reduces the original collection to one-fifth part.

6. By proceeding in this manner, several species of words are omitted in the founts. 1. Obsolete words; because they occur so seldom, that the difference of time lost in composing them in the ordinary method would be imperceptible. 2. Technical terms, names of places, animals, &c.; though, for any particular work, the terms peculiar to it may be added to the fount in a biformed alphabet apart. 3. Real compounds, or words that may be compounded of others, are also rejected; because we actually have the words already, and they may be joined with sufficient expedition, though the spaces are annexed to each, by being constructed accordingly. 4. Those of the same spelling are likewise omitted, though they bear different significations, for obvious reasons. Logography.

7. The variation of tenses, degrees of comparison, and numerous words in the English language, having in general, the same terminations, such as ED, ING, LY, MENT, NESS, &c. an alphabet may be formed of such a kind as is capable of being annexed to the absolute words or radices, as expeditiously as the whole word could be found in the fount, from its being thereby so much less extended. Thus, by dividing several words into their radices and terminations, many other words may be formed from their radix by the addition of various terminations, and each termination may be added to other radices to which they are applicable.

8. Some radices are imperfect, viz. such as end with the vowel *e*, which must therefore be added in the usual way of composition. Thus, in the word *adore*, the radix is *ador*, to which the terminations *es*, *ed*, *est*, *eth*, *er*, *ing*, may be added occasionally.

9. By rejecting also the words which come under this last denomination, the number necessary for a fount is reduced to one-tenth of what it would otherwise be, as will appear evident from the following considerations:

1*st*, There are at least 42 verbs, the infinitive of which ends in *ify*; as *qualify*, *signify*; the radices of which are *qual*, *sign*; the terminations are, *ifies*, *ified*, *ifying*, &c. And Mr Johnson informs us, that by applying these radices to other terminations, he was enabled to dispense with more than 500 words which would otherwise have been necessary. 2*d*, For all regular verbs, no more than six terminations are necessary, viz. *s*, *est*, *eth*, *ed*, *es*, *ing*. There are but few irregular ones in the English language; whence it happens that 12 or 14 words may be formed from one single perfect verb as a radix, and many imperfect ones save double that number.

10. By using only the set of terminations which may be contained in a box of two feet square, the common operation of printing would be shortened nearly one half; and in order to find out those which are most in use, and fittest to retain, our author digested them alphabetically, with the radices, words, or syllables, which make complete words annexed to them. Thus,

tain ——s, ——ed —ing ——ment	abs—apper—ascer de—dis—con cer—cap—cur enter—main—re—sus, &c.

11. Thus it will be found, that out of more than 100,000 words of which the English language consists, there will not be wanted much above 3500 for a complete fount. This will be very evident to any person who consults a dictionary. He will there find, that a vast number of words require an explanation; whereas in any miscellaneous work, there are none but what can be understood most readily either together or apart. Newspapers retain more of the uncommon kind of words than any others. "The vocabulary (says our author)

Logography. or alphabet as it is called, of the Chinese, consists of above 80,000 letters or characters; yet he is admitted a master of the language who knows about 4000 of them, no more being in general use."

The expedition with which the logographic method of printing can be accomplished, depends essentially on their arrangement; which, from great numbers of experiments, our author found to be best accomplished in the following manner: 1. Words of one, two, or three syllables, are alphabetically placed by themselves, including all possible commencing syllables, by which the compositor cannot fail of finding the word either in whole or in part, let it be what it will; and when the whole cannot be found at once, the remainder may easily be found in single or double syllables among the terminations. 2. All words above three syllables have the same alphabetical arrangement; the terminations being the same at the bottom of each. Experience shows, that by a very few lessons, the meanest capacity may determine the number of syllables, and refer to the particular case containing words of that number, there being conspicuous references to each; and by thus equalizing them, any person may possess himself very expeditiously of what he wants. Even boys who scarcely knew more than the letters of the alphabet, were hardly a fortnight employed in this method, when they could at the first glance tell the number of letters contained in any word.

By this simplicity of arrangement, any intelligent person, who never composed in his life, by being placed in a room with the apparatus, could compose and print, without other previous instruction than desiring him to remember that the words under three syllables, and those above three, are placed in separate alphabets; and that whenever he wants a word, the first letter is seen in capitals of two inches on the walls, the second in letters of one inch in right lines; and where it is necessary to have more columns than one for such second letter, the third is given in red down the column, comprehending about 12 divisions, to contain the types of the word coming under such reference.

To exemplify this method as far as it can be done without actually seeing the apparatus, our author instances the two words *Above* and *Unfortunately*. In looking for the former, the first letter, A, is seen upon the wall as already mentioned: the second, B, is on the case under it, and down that column is OVE, opposite to the cell containing the types of the whole word; which would be only three references instead of five with spaces, as in the common method. The other word, viz. *Unfortunately*, may be found by the same references, though it contains 13 letters; but "admitting that practice will give the word as soon as a single letter, the average will be found eight for one."—Our author's explanation of the method in which this word might be composed, however, seems by no means intelligible.—"For this distinction in the cases (says he), the alphabet, or rather marks of first reference in large characters on the wall, is divided into two classes, not as vowels and consonants, but as follows, viz. A, Con, Dis, E, In, O, P, S, Un, commencing references, the second or subsequent letters of the words being in a right line from left to right, and down each column is found the remainder of the reference to the words, distinguishing always the third letter in red. The second distinction is that for all other commencing letters, the second letter of reference is in a column down, and the third letter in lines from left to right in red. Logography || Lohoch.

These are the directions given by our author for forming a fount of words; the next requisite is a fount of syllables, formed in the following method: 1. A complete set of two letters was obtained in all their possible combinations, amounting to 676. 2. Having next obtained the possible combination of these letters, viz. 17576, by retaining only all possible syllables, and words of three letters, it is reduced to the 30th part, which answer all the purposes of composing with syllables of two and three letters, for Latin, French, English, and all names of persons, places, and things, every possible syllable being comprehended among them. Hence it forms an universal triformed alphabet, where English characters are used; from whence all partial biformed and triformed alphabets in the arrangement of English, French, Latin, and all technical matters, are drawn. Though combinations of four letters are again 26 times the number of those of three letters, and five letters increase in the same ratio; yet as much as all possible combinations increase in quantity proportionate to the number of letters combined, so they decrease in the actual number of syllables included among them, insomuch, that all the syllables of four, five, six, and seven letters together, are considerably fewer than the syllables of three letters only.—Besides the two founts already mentioned, a third was found necessary for such terminations as are most commonly followed by particular punctuations; but after some consideration, this was judged unnecessary.

Our author now proceeds to obviate some objections which must naturally occur to one who first hears of his invention. These are,

1. A single letter damaged in a word renders the whole useless.

This is not denied by Mr Johnson; but he contends, that the quantity of metal lost in this manner is quite trifling.

2. How are the blanks or spaces in a line to be managed, as these are by no means equal?

To this our author replies, that, at the time of writing the pamphlet, he was undetermined whether it be most eligible to have spaces cast along with the beginnings of words, or to space them in the common manner. The former would be more expeditious; and where a greater distance is required, other spaces may be introduced in the ordinary method.

3. How is a long word at the end of a line to be divided?

This may be easily accomplished by means of the syllabic fount already mentioned.

4. How is the error of substituting one word for another to be rectified?

The answer to this is, that an error of the kind specified may be corrected in the very same manner as is done in common printing. Long words may be divided by means of the syllabic fount already mentioned, and the intervals between the words may be filled up with *spaces* as usual.

LOGWOOD. See HÆMATOXYLON, BOTANY and DYEING *Index*.

LOHOCH, or LOCH, in *Pharmacy*, a composition

of

Lohoch || Lollards.

of a middle consistenee between a soft electuary and syrup, principally used in disorders of the lungs.

LOINS, in *Anatomy*, the two lateral parts of the umbilieal region of the abdomen.

LOIRE, the largest river in Franee, rises in the mountains of the Cevennes, and, after running a course of about 500 miles, falls into the bay of Biseay.

LOKE, in *Mythology*, the name of one of the deities of the northern nations, answering to the Arimanius among the Persians, whom they represent as at enmity both with gods and men, and the author of all the evils which desolate the universe. Loke is deseribed in the Edda as produeing the great serpent which eneircles the world; which seems to have been intended as an emblem of eorruption or sin: he also gives birth to Hela or death, the queen of the infernal regions; and also to the wolf Fenris, that monster who is to encounter the gods and destroy the world.

LOKMAN the Wise, an eminent philosopher among the Easterns. The Arabians say he was the son of Baura, the son or grandson of a sister or aunt of Job. He was an Ethiopian, and a slave for some time. It is related that he was born in the time of David, and lived till the age of the prophet Jonas. Some suppose him to have been the same with Æsop the mythologist: and indeed we find in the parables or apologues of Lokman in Arabie, many particulars that are seen in Æsop's fables; so that it is not easy to determine whether the Greek or the Arabian are the originals. He is said to have been deformed in his person; but that this defect was sufficiently made up by the perfections of his mind. Some pieces of his are extant; and he was looked upon as so excellent a person, that Mahomet has inserted a chapter of the Koran, called after his name, in which he introduces God as saying, "We heretofore bestowed wisdom on Lokman."—It is related that he got his liberty on the following occasion. His master, having given him a bitter melon to eat, he ate it all. His master, surprised at his exact obedience, asked, How it was possible for him to eat such a nauseous fruit? He answered, "I have received so many favours from you, that it is no wonder I should once in my life eat a bitter melon from your hand." This generous answer of the slave struck the master to such a degree, that he immediately gave him his liberty. M. Galland translated all the fables of Lokman, and Bidpai or Pilpay, a bramin philosopher, which were published at Paris in 1724.

LOLIUM, Darnel Grass; a genus of plants belonging to the triandria class; and in the natural method ranking under the 4th order, *Gramina*. See Botany *Index*.

LOLLARDS, in ecclesiastical history, a religious sect, differing in many religious points from the church of Rome, which arose in Germany about the beginning of the 14th century; so called, as many writers have imagined, from Walter Lollard, who began to dogmatize in 1315, and was burnt at Cologn: though others think that Lollard was no surname, but merely a term of reproach applied to all hereties who concealed the poison of error under the appearance of piety.

The monk of Canterbury derives the origin of the word Lollard among us, from *lolium*, "tare;" as if the Lollards were the tares sown in Christ's vineyard. Abelly says, that the word Lollard signifies "praising God," from the German *loben*, "to praise," and *herr*, "Lord;" because the Lollards employed themselves in travelling about from place to place, singing psalms and hymns. Lollards.

Others, much to the same purpose, derive *lollhard*, *lullhard*, or *lollert*, *lullert*, as it was written by the ancient Germans, from the old German word *lullen*, *lollen*, or *lallen*, and the termination *hard*, with which many of the High Dutch words end. *Lollen* signifies "to sing with a low voice," and therefore Lollard is a singer, or one who frequently sings; and in the vulgar tongue of the Germans it denotes a person who is continually praising God with a song, or singing hymns to his honour. The Alexians or Cellites were called *Lollards*, because they were public singers who made it their business to inter the bodies of those who died of the plague, and sang a dirge over them in a mournful and indistinct tone as they carried them to the grave. The name was afterwards assumed by persons that dishonoured it; for we find, among those Lollards who made extraordinary pretences to piety and religion, and spent the greatest part of their time in meditation, prayer, and such acts of piety, there were many abominable hypocrites, who entertained the most ridiculous opinions, and concealed the most enormous vices under the specious mark of this extraordinary profession. And many injurious aspersions were propagated against those who assumed this name by the priests and monks; so that, by degrees, any person who covered heresies or crimes under the appearance of piety, was called a *Lollard*. Thus the name was used not to denote any one particular sect, but was formerly common to all persons and all sects who were supposed to be guilty of impiety towards God or the church, under an external profession of extraordinary piety. However, many societies consisting both of men and women under the name of *Lollards*, were formed in most parts of Germany and Flanders, and were supported partly by their manual labours, and partly by the charitable donations of pious persons. The magistrates and inhabitants of the towns where these brethren and sisters resided, gave them particular marks of favour and protection, on account of their great usefulness to the sick and needy. They were thus supported against their malignant rivals, and obtained many papal constitutions by which their institute was confirmed, their persons exempted from the cognizance of the inquisitors, and subjected entirely to the jurisdiction of the bishops; but as these measures were insufficient to secure them from molestation, Charles duke of Burgundy, in the year 1472, obtained a solemn bull from Pope Sixtus IV. ordering that the Cellites or Lollards should be ranked among the religious orders, and delivered from the jurisdiction of the bishops; and Pope Julius II. granted them yet greater privileges in the year 1506. Mosheim informs us that many societies of this kind are still subsisting at Cologn, and in the cities of Flanders, though they have evidently departed from their ancient rules.

Lollard and his followers rejected the sacrifice of the mass, extreme unction, and penances for sin; arguing, that Christ's sufferings were sufficient. He is likewise said to have set aside baptism, as a thing of no effect; and repentance, as not absolutely necessary, &c.

Lollards || Lombards.

&c.—In England, the followers of Wickliffe were called, by way of reproach, *Lollards*, from some affinity there was between some of their tenets; though others are of opinion that the English Lollards came from Germany.

They were solemnly condemned by the archbishop of Canterbury and the council of Oxford.

LOMBARD, PETER, well known by the title of *Master of the Sentences*, was born at Novara in Lombardy; but being bred at Paris, he distinguished himself so much at that university, that, he first had the canonry of Chartres conferred on him, was some time tutor to Philip son of Louis le Gros, and lastly obtained the see of Paris. He died in 1064. His work of the Sentences is looked on as the source of the scholastic theology of the Latin church. He wrote also Commentaries on the Psalms, and on St Paul's Epistles.

LOMBARDS, a Scandinavian nation, who settled in Italy in the fourth century, and for some time made a considerable figure.

1 Etymology of the name.

Their name of *Lombards*, or *Longobards*, is by some derived from the word *lack*, or *lache*, signifying in the German tongue *winter;* because the Lombards, while in Scandinavia, lived in marshes, or near the sea. Others think that it comes from the two German words *langen harden*, or *hellebarden*, that is, from the long halberts they were supposed to use in war. But Paulus Diaconus their historian, and who was himself a Lombard, tells us that they were called *Longobards* from the length of their beards. A nation called the *Lombards* is mentioned by Tacitus, Strabo, and Ptolemy; but these are different from the Lombards who afterwards settled in Italy, and are reckoned to be the same with the Gepidæ, whom the Italian Lombards almost exterminated. The Lombards who settled in Italy are first mentioned by Prosper Aquitanus, bishop of Rhegium in the year 379. That writer tells us, that about this time the Lombards, abandoning the most distant coasts of the ocean, and their native country Scandinavia, and seeking for new settlements, as they were overstocked with people at home, first attacked and overcame the Vandals in Germany. They were then headed by two chiefs, Iboreus and Aion; who, dying about the year 389, were succeeded by Agilmund, who is commonly reckoned the first king of the Lombards.

2 Vandals defeated by the Lombards.

3 They settle in the country of the Rugians.

Before the time of Odoacer, the Lombard history affords nothing remarkable; in his time, however, they settled on the Danube, in the country of the Rugians, whom Odoacer had almost totally exterminated or carried into captivity. During their stay in this country, they rendered themselves formidable to the neighbouring nations, and carried on successful wars with the Heruli and Gepidæ. In 526, they were allowed by the emperor Justinian to settle in Pannonia; and here they made war a second time with the Gepidæ. Alboinus, the Lombard king, killed the king of the Gepidæ with his own hand, put his army to the rout, and cut such numbers of them in pieces, that they ceased from that time to be a nation. Having caused the deceased king's head to be cut off, he made a cup of his skull, called in the language of the Lombards *schala*, which he made use of in all public entertainments. However, having taken, among many other captives of great distinction, the last king's daughter, by name *Rosamunda*, he married her after the death of his former wife Clodisvinta, the daughter of Clotaire king of France. Lombards.

4 Destroy the Gepidæ.

By this victory Alboinus gained such reputation that his friendship was courted by Justinian; and, in consequence of the emperor's application, a body of 6000 Lombards were sent to the assistance of Narses against the Goths. The success of the Romans in this expedition, the invasion of Italy by the Lombards, and their successes in that country, have been taken notice of under the article ITALY, N° 28—32. At last Alboinus, having made himself master of Venetia, Liguria, Æmilia, Hetruria, and Umbria, was slain by the treachery of his wife, in the year 575, the fourth of his reign. This princess was the daughter of the king of the Gepidæ, whom Alboinus had killed in battle, and make a cup of his skull, as above related. As he was one day feasting at Verona, with his chief favourites and principal officers, in the height of his mirth he sent for the queen, and, filling the detested cup, commanded her to drink merrily with her father. Rosamund, struck with horror, hurried out of the room; and highly incensed against her husband for thus barbarously triumphing over the misfortunes of her family, resolved, at all events, to make him pay dear for such an inhuman and affronting conduct. Accordingly, she discovered her intention to Helmichild the king's shield-hearer, a youth of great boldness and intrepidity. Helmichild peremptorily refused to imbrue his hands in the blood of his sovereign, or to be any way accessory to his death; and in this resolution he persisted, till he was, by a shameful stratagem, forced by the queen to a compliance: for she, knowing that he carried on an intrigue with one of her ladies, placed herself one night in her bed, and receiving the youth, indulged him as if she had been his own mistress in his amorous desires; which she had no sooner done, than discovering herself to the deceived lover, she told him that he must now either put the king to death, or be put to death by him. Helmichild, well apprised, that, after what he had done, his safety depended upon the death of the king, engaged in the treason, which he otherwise abhorred. One day, therefore, while Alboinus was reposing in his chamber after dinner, Helmichild, with some others whom he had made privy to his design, breaking in unexpectedly, fell upon the king with their daggers. Alboinus starting up at their first coming in, laid hold of his sword, which he had always by him; but having in vain attempted to draw it, the queen having beforehand fastened it in the scabbard, he defended himself for some time with a footstool; but was in the end overpowered, and despatched with many wounds.

5 Alboinus king of the Lombards assassinated at the instigation of his wife.

Rosamund had promised to Helmichild, that, as soon as he had despatched the king, she would marry him, and, with her person, bestow upon him the kingdom of the Lombards. The first part of her promise she immediately performed; but was so far from being able to bestow the crown upon him, that both of them were obliged to save themselves by flight. They fled to Longinus the exarch of Ravenna, taking with them all the jewels and treasure of the late king. Longinus received her with the greatest marks of friendship and kindness, and assured her of his protection. She had not been long in Ravenna, however, before the exarch, judging

Lombards. judging that a favourable opportunity now offered of making himself king of Italy by her means, imparted his design to her, and declared his intention to marry her, provided, by some means or other, she despatched Helmichild.—Rosamund, highly pleased with the proposal, resolved to satisfy her ambition by getting rid of the person whom she had married in order to gratify her revenge. Accordingly, having prepared a strong poison, she mixed it with wine, and gave it to her husband as he came out of the bath, and called for drink, according to his custom. Helmichild had not half emptied the cup, when, by the sudden and strange
6 operation which he felt in his bowels, he concluded
Her death. what it was; and, with his sword pointed at the queen's breast, compelled her to drink the rest. The poison had the same effect on both; for they died in a few hours. Longinus, on the death of the queen, laid aside all thoughts of making himself king of Italy, and sent the king's treasure to Constantinople, together with Albisoinda, the daughter of Alboinus by Rosamund, whom she had brought along with her.

After the death of Alboinus, the Lombards chose Clephis, one of the nobility, for their king. He was murdered after a short reign of 18 months; upon which
7 ensued an interregnum of 10 years, as related under
Monarchy abolished. the article ITALY, N° 32. During this time, they extended their conquests in that country; but at last the Romans, jealous of their progress, resolved to put a stop to their victories, and, if possible, to drive them quite out. For this purpose, they designed not only to employ their own force, but entered into alliance with the Franks; which so alarmed the Lombards that they re-established the monarchical form of go-
8 vernment among themselves, and chose Autharis the
Restored. son of Clephis for their king. This monarch, considering that the power of the dukes, who had governed Lombardy for the space of 10 years, was during that length of time very much established, and that they would not probably be willing to part with the authority which they had so long enjoyed, allowed them to continue in their governments; but obliged them to contribute one moiety of their revenues towards the maintenance and support of his royal dignity, suffering them to dispose of the other as they thought proper. He reserved to himself the supreme dominion and authority; and took an oath of the dukes, that in time of war, they would readily assist him to the utmost of their power. Though he could remove the dukes at pleasure, yet he deprived none of them of their dukedoms, except in cases of treason; nor gave them to others, except when their male issue failed. Having settled matters in this manner with the dukes, he enacted several wholesome laws against theft, rapine, murder, adultery, and other vices which prevailed among his subjects, and was the first of the Lombard kings who embraced Christianity. Most of his subjects followed the example of their monarch; but as they were all instructed by Arian bishops, they continued long infected with that heresy; which occasioned great disputes between them and the orthodox bishops of the cities subject to them.

9 From the re-establishment of the monarchy under
Written laws when first introduced. Autharis, to the reign of Rotharis in 636, the history of the Lombards affords nothing memorable. This period is remarkable for the introduction of written laws among these people. Before his time they had been governed only by tradition: but Rotharis, in imitation of the Romans and Goths, undertook the publishing of written laws; and to those which he enacted, many were added by the succeeding princes. Grotius prefers the method which the Lombards followed in making laws, to that which was practised by the Romans themselves. Among the latter the emperor was the sole lawgiver; so that whatever pleased him had the force of a law. But the Lombard kings did not assume that power to themselves, since their laws were enacted in public assemblies, convened for that purpose, after they had been maturely examined and approved of by all the lords of the kingdom. From these assemblies were excluded the ecclesiastic order, and the people: so that the legislative power was lodged in the king and nobles alone. Lombards.

The reign of Rotharis is remarkable, not only for his introducing written laws among his subjects, but for the conquests he made, and the successful wars carried on with the exarch of Ravenna, whom he totally defeated in several engagements, and made himself master of some part of his territories. This monarch died in 652; and the affairs of the Lombards went on prosperously, till the ambition of Luitprand laid the foundation of the total ruin of his kingdom. He ascended the throne of Lombardy in 711, and
10 watched all opportunities of enlarging his dominions at
Luitprand's ambition. the expence of the emperor's. Of this, a fair opportunity offered in 716: for the emperor Leo Isauricus, who at that time reigned in the east, having, by his famous edict, forbidden the worship of images, and ordered them to be everywhere pulled down, the people were so provoked at that innovation, that, in several places, they openly revolted, and, falling upon the emperor's officers, drove them out of the cities. In the east, Germanus, patriarch of Constantinople, opposed the emperor's design with great warmth; but Leo caused him to be deposed, and Anastasius to be raised to that see in his room, ordering at the same time all the images in the imperial city to be pulled down and publicly burnt. He strictly enjoined his officers in the west, especially the exarch of Ravenna, to see his edict punctually obeyed in their respective governments. In compliance with these orders, Scholasticus, then exarch, began to pull down the images in all the churches and public places in Ravenna; which incensed the superstitious multitude to such a degree, that taking arms, they openly declared they would rather renounce their allegiance to the emperor than the worship of images.

Thus a kind of civil war being kindled in the city, Luitprand thought he had now a favourable opportunity of making himself master of the seat of the exarch, not doubting but the conquest of such an important place would be followed by that of the whole exarchate. Having therefore drawn together all his
11 forces, he unexpectedly appeared before Ravenna, and
He besieges and at last takes Ravenna. closely besieged it. The exarch little expected such a surprise, as a friendly correspondence had been maintained for many years between the exarchs and the Lombard kings. However, he defended the place with such courage and resolution, that Luitprand, despairing of success, broke up the siege and led his army against Classis, at a small distance from Ravenna, which

Lombards. which he took, plundered, and levelled with the ground. The loss of this place, and the severe treatment the inhabitants met with from the king, threw the citizens of Ravenna into the utmost consternation; which Luitprand being informed of, he resolved to take advantage of their fears, and, returning before Ravenna while the inhabitants were thus disheartened, to attempt once more the reduction of that place. Accordingly he led his whole army against it, and, by frequent attacks, tired the inhabitants and garrison to such a degree, that the exarch, finding they could hold out no longer, and despairing of relief, privately withdrew. Luitprand, informed of his retreat, attacked the town with more violence than ever; and, having carried it by storm, gave it to be plundered by his soldiers, who found in it an immense booty, as it had been for a long time the seat of the Roman emperors, of the Gothic kings, and the exarchs. The king stripped it of most of its valuable monuments of antiquity, and caused, amongst the rest, an equestrian statue of an emperor, of wonderful workmanship, to be conveyed to Pavia, where it is to be seen to this day. The reduction of Ravenna was followed by the surrender of several cities of the exarchate, which Luitprand reduced to a dukedom; appointing Hildebrand his grandson to govern it with the title of duke: and giving him, as he was yet an infant, Peredeus duke of Vicenza for his guardian.

12 Reduces the exarchate to a dukedom.

The conquest of Ravenna and the greater part of the exarchate did not a little alarm Gregory II. bishop of Rome. He was then at variance with the emperor, whose edict against the worshipping of images he had opposed with all his might, and by that means provoked Leo to such a degree, that he had threatened to drive him from the see, and send him into exile. However, the pope, no less jealous of the power of the Lombards than all his predecessors had been, resolved, by some means or other, to put a stop to their conquests. The only prince in Italy to whom he could have recourse was Ursus duke of Venice, the Venetians making already no inconsiderable figure.

13 The exarch assisted by the Venetians;

To him accordingly, he wrote a very pressing letter; conjuring him to assist his worthy son the exarch, and, for the love of the holy faith, to attempt with him the recovery of the exarchate, which the wicked nation of the Lombards had unjustly taken from his sons Leo and Constantine emperors. Ursus and the Venetians, moved with the pope's letter, and at the same time greatly alarmed at the growth of so powerful a neighbour, promised to assist the exarch with the whole strength of their republic; and accordingly fitted out a considerable fleet, pretending it was designed for the service of the emperor against the Saracens. At the same time the exarch, who had taken refuge in Venice; abandoning that place, as it were in despair of bringing the duke over to his party, raised, in the places still subject to the emperor, what forces he was able; and having got together a considerable body, he marched with them towards Imola, giving out that he designed to besiege that city; but turning on a sudden towards Ravenna, as had been agreed on between him and the Venetians, he laid siege to it by land, while they invested it almost at the same instant by sea. Peredeus defended the town for some time with great courage and resolution: obliging all those who were able to bear arms to repair to the walls. But the Venetians having, in spite of all opposition, forced open one of the gates on the side of the sea, the city was taken, and Peredeus slain, while he was attempting, at the head of a choice body, to drive the enemy from the posts they had seized. As for Hildebrand, he fell into the hands of the Venetians; who, having thus recovered Ravenna to the emperor, returned home, leaving the exarch in possession of the city. Luitprand was then at Pavia; but the town was taken before he could assemble his troops to relieve it.

Lombards. 14 who retake Ravenna.

And now Gregory bishop of Rome, to whom the recovery of Ravenna was chiefly owing, persuading himself, that the emperor would, out of gratitude, give ear to his remonstrances and admonitions, began to solicit him with more pressing letters than ever to revoke his edict against the worship of images: but Leo, well apprised that the bishop, in all the measures he had taken, had been more influenced by a regard to his own interest than to that of the empire, instead of hearkening to his remonstrances, was still more provoked against him for thus obstinately opposing the execution of his edict. Being, therefore, resolved at all events to have it observed in Rome itself, and, on the other hand, not doubting but the pope would oppose it to the last with all his might; in order to remove all obstacles, he sent three officers to Rome, with private orders, either to despatch the pope, or to take him prisoner, and convey him to Constantinople. At the same time, he wrote to Mauritius duke of Rome, secretly enjoining him to assist his three officers in their undertaking: but no favourable opportunity offering to put their design in execution, the emperor, in the year 725 recalled Scholasticus, and sent Paul a patrician into Italy, to govern in his room, with private instructions to encourage the above-mentioned officers with the promise of great rewards, and to assure them of his protection.

But, in the mean time, the plot was discovered, and two of the conspirators were apprehended by the citizens of Rome, and put to death: the third having escaped into a monastery, where he took the monastic habit and ended his days. Hereupon the exarch, in compliance with the emperor's orders, resolved to proceed no longer by secret plots, but by open force. Accordingly, he drew together a considerable body of troops, and set out at the head of them on his march to Rome, with a design to seize on the pope, and send him, as he had engaged to do, in chains to Constantinople. But on this occasion, Luitprand, though highly provoked against Gregory for having stirred up the Venetians against him, yet resolved to assist him and the citizens of Rome against the exarch, in order to keep the balance even between them, and by assisting sometimes the one and sometimes the other, weaken both. Pursuant to this resolution, he ordered the Lombards of Tuscany, and those of the dukedom of Spoletto, to join the pope and the inhabitants of Rome; who, being by this reinforcement far superior in strength and number to the exarch, obliged him to return to Ravenna, and give over all thoughts of any further attempt on the person of the pope.

15 Luitprand assists the pope against the exarch.

In the mean time, Leo, persisting in his former resolution of suppressing throughout his dominions the worship of images, sent fresh orders to the exarch

Lombards. Paul, strictly enjoining him to cause his edict to be put in execution in all the cities of Italy under his empire, especially in Rome. At the same time, he wrote to the pope, promising him his favour and protection if he complied with the edict; and declaring him, if he continued to oppose it, a rebel, and no longer vested with the papal dignity. But Gregory was so far from yielding to the emperor's threats, or promises, that on the contrary, he solemnly excommunicated the exarch for attempting to put the imperial edict in execution; and at the same time wrote circular letters to the Venetians, to King Luitprand, to the Lombard dukes, and to all the chief cities of the empire, exhorting them to continue stedfast in the Catholic faith, and to oppose with all their might such a detestable innovation. These letters made such an impression on the minds of the people in Italy, that though of different interests, and often at war with one another, they all united; protesting they would defend the Catholic faith, and the life of the pope, in so glorious a cause, at the expence of their own; nay, the citizens of Rome, and the inhabitants of Pentapolis, now Marca d'Ancona, not contenting themselves with such a protestation, openly revolted from the emperor; and, pulling down his statues, they elected, by their own authority, magistrates to govern them during the interregnum. We are even told, that, transported with a blind zeal, they were for choosing a new emperor, and conducting him to Constantinople, not doubting but the people would everywhere join them. But the pope, thinking this resolution unseasonable, and not to be easily put in execution, opposed it; so that it did not take place.

In the mean time the exarch Paul, having gained a considerable party in Ravenna, began, pursuant to the the repeated orders from the emperor, to remove the images, as so many idols, out of the churches. Here-
15 upon the adverse party, supported and encouraged by
A civil war in Ravenna. the pope, flew to arms; and, falling upon the *iconoclasts*, or image-breakers, as they styled them, gave rise to a civil war within the walls of Ravenna. Great numbers were killed on both sides: but those who were for the worship of images prevailed in the end, a dreadful slaughter was made of the opposite party, and, among the rest, the exarch himself was murdered. However, the city of Ravenna continued faithful to the emperor; but most of the citizens of Romagna belonging to the exarchate, and all those of Pentapolis or La Marca d' Ancona, abhorring the emperor as an heretic, submitted to Luitprand king of the Lombards; who, pretending a zeal for the Catholic religion, took care to improve the discontent of the people to his advantage, by representing to them, that they could never maintain their religious rights under a prince, who was not only an heretic, but a persecutor of the orthodox.

In Naples, Exhilaratus, duke of that city, having received peremptory orders from the emperor to cause his edict to be put in execution, did all that lay in his power to persuade the people to receive it; but finding all his endeavours thwarted by the bishop of Rome, for whom the Neapolitans had a great veneration, he hired assassins to murder him. But the plot being discovered, though carried on with great secrecy, the Neapolitans, highly provoked against the duke, tore both him and his son to pieces, and likewise put to Lombards. death one of his chief officers, who had composed a libel against the pope. Luitprand, and Gregory at that time duke of Benevento, laying hold of so favourable an opportunity to make themselves masters of the dukedom of Naples, did all that lay in their power to persuade the Neapolitans to submit to them. But the Neapolitans, bearing an irreconcilable hatred to the Lombards, with whom they had been constantly at variance, rejected every overture of that nature with the utmost indignation; and continuing stedfast in their allegiance to Leo, received from Constantinople one Peter, who was sent to govern them in the room of Exhilaratus. Some writers suppose the Neapolitans, in this general revolt of the cities of Italy, to have shaken off the yoke with the rest, and to have appointed magistrates of their own election to govern them, in the room of the officers hitherto sent from Constantinople, or named by the exarch: but they are certainly mistaken; it being manifest from history, that Peter succeeded Exhilaratus in that dukedom, and that the Neapolitans continued to live under the emperors, till they were conquered many years after by the Normans.

In the mean time, Leo hearing of the murder of the exarch, and the general revolt of the cities, and not doubting but the pope was the chief author of so much mischief, sent the eunuch Eutychius into Italy, with the title and authority of *exarch*, strictly enjoining him to get the pope despatched by some means or other, since his death was absolutely necessary for the tranquillity of Italy. The exarch spared no pains to get the pope into his power: but a messenger, whom he had sent to Rome, being apprehended by the citizens, and an order from the emperor being found upon him to all his officers in that city, commanding them to put the pope to death at all events, the pope's friends thenceforth guarded him with such care, that the exarch's emissaries could never afterwards find an opportunity of executing their design. As for the messenger, the Romans were for putting him to death; but the pope interposed, contenting himself with excommunicating the exarch.

17 And now the Romans, provoked more than ever
The Romans revolt. against Leo, and, on the other hand, unwilling to live under the Lombards, resolved to revolt from the emperor, and appoint their own magistrates, keeping themselves united under the pope, not yet as their prince, but only as their head. This they did accordingly; and from these slender beginnings the sovereignty of the popes in Italy took its rise, though they did not then, as is commonly supposed by historians, but many years after, become sovereign lords of Rome.

Eutychius failed in his design upon the life of the pope; but having brought with him from Constantinople a good number of troops, he easily quelled the rebellion in Ravenna, and severely punished the authors of the late disturbances. As for the rebellious Romans, he was well apprized he could never reduce them, so long as they were supported by the king of the Lombards; and therefore he employed all his art and policy to take off that prince from the party of the Romans, and bring him over to his own.

Luitprand, for some time, withstood all his offers; but

Lombards.

but Thrasimund duke of Spoletto revolting at this very juncture, the exarch, laying hold of that opportunity, offered to assist the king with all his strength against the rebellious duke, provided he would, in like manner, assist him against the pope and the Romans. With this proposal Luitprand readily closed; and a league being concluded upon these terms between him and the exarch, the two armies joined, and began their march towards Spoletto. At their approach, the duke, despairing of being able to resist two such powers, came out with a small attendance to meet them, and, throwing himself at the king's feet, sued, in that humble posture, for pardon; which Luitprand not only granted him, but confirmed him in the dukedom, after he had obliged him to take a new oath of allegiance, and give hostages for his fidelity in time to come. From Spoletto, the two armies marched, in pursuance of the treaty, to Rome; and encamped in the meadows of Nero, between the Tiber and the Vatican.

18 Luitprand concludes an alliance with the exarch

19 The pope submits to Luitprand.

Gregory had caused the city of Rome to be fortified in the best manner he could; but being sensible that the Romans alone could not long hold out against two such armies, and reflecting on the kind treatment the duke of Spoletto had met with upon his submitting to the king, he resolved to follow his example: and accordingly, taking with him some of the clergy, and the principal inhabitants of the city, he went to wait on the king in his camp; and there, with a pathetic speech, as he was a great master of eloquence, softened Luitprand to such a degree, that, throwing himself at his feet in the presence of the whole army, he begged pardon for entering into an alliance against him: and, assuring him of his protection for the future, he went with them to the church of St Peter; and there, disarming himself in the presence of his chief officers, he laid his girdle, his sword, and his gauntlet, with his royal mantle, his crown of gold, and cross of silver, on the apostle's sepulchre. After this, he reconciled the pope with the exarch, who was thereupon received into the city, where he continued for some time, maintaining a friendly correspondence with the pope. At this time an impostor, taking the name of *Tiberius*, and pretending to be descended from the emperors, seduced a great many people in Tuscany, and was by them proclaimed emperor. The exarch resolved to march against him; but as he had not sufficient forces to oppose the rebels, Gregory, who let no opportunity slip of obliging Leo, persuaded the Romans to attend the exarch in this expedition; by which means the usurper being taken in a castle, his head was sent to the emperor, and the rebellion utterly suppressed. But the emperor still insisting upon his edict against the images being received in Rome, the Romans, at the instigation of the pope, publicly renounced their allegiance to Leo, paid him no more tribute, and withdrew for ever their obedience to the emperors of the East.

20 The emperor seizes the dominions of the pope.

Leo, informed of this revolt, and not questioning but the pope was the author of it, immediately caused all the patrimonies of the church of Rome in Sicily, Calabria, and his other dominions, to be confiscated. At the same time, he ordered a powerful army to be raised, with a design to recover the towns that had revolted; to chastise the Romans for their rebellion; and, above all, to be revenged on the pope, who had raised all these disturbances, by himself opposing, and persuading others to oppose, the execution of his edict. Gregory, alarmed at the warlike preparations that were carrying on throughout the empire, and well apprised that they were chiefly designed against him and the Romans, resolved to recur to the protection of the French, the only nation at that time capable of coping with the emperor, and on whom, on account of their zeal for religion, he thought he might depend. The Lombards were then very powerful; but, as they wanted to be masters of Rome, he did not think it advisable to trust them. The Venetians, though zealous in the defence of the pope, were not yet in a condition to withstand the power of the emperor; and, besides, were jealous of the Lombards, who watched all opportunities of enlarging their dominions at the expence of their neighbours. As for Spain, it was then in a most deplorable condition, being overrun, and almost wholly ruined, by the Saracens.

Lombards.

21 Who applies to the French.

The French nation was at this time governed by the celebrated Charles Martel, who had distinguished himself in a most eminent manner in the wars of France and Germany; and had, not long before, gained a signal victory over the Saracens in the neighbourhood of Tours; whence he was generally reputed the best commander, and the greatest hero, of his time. To him, therefore, Gregory sent a solemn embassy, with a great number of relics, earnestly entreating him to take the Romans, and the church, under his protection, and defend them against the attempts of Leo. The ambassadors were received with extraordinary marks of honour; and a treaty was soon concluded between them and Charles, who engaged to march into Italy in person, at the head of a powerful army, in defence of the Romans and the church, if they should be attacked either by the emperor or the Lombards. On the other hand, the Romans were to acknowledge him for their protector, and confer on him the honour of the consulship as it had been formerly conferred on Clovis by the emperor Anastasius, after that prince had defeated the Visigoths. The ambassadors returned from France loaded with rich presents. But Gregory did not long enjoy the fruit of their negociations; for he died the same year 731, and was succeeded by Gregory III. in whose time some place the above-mentioned embassy.

22 End of the Lombard monarchy.

The French nation was at this time just recovered from its distressed situation under the descendants of Clovis; and by the bravery and conduct of Charles Martel, had become the most powerful kingdom in the west. His successor Pepin was no less wise and powerful than his father had been; and as the ambition of the Lombard princes would be satisfied with nothing less than the entire conquest of Italy, the French monarch, Charlemagne, under colour of assisting the pope, at last put an end to the empire of Lombardy, as related under the article FRANCE, N° 21, 22.

23 Character, &c. of the Lombards.

The Lombards were at first a cruel and barbarous nation; but divesting themselves by degrees of their native fierceness and barbarity, especially after they had embraced the Christian religion, they governed with such equity and moderation, that most other na-

Lombards ‖ Loch-Lomond.

tions envied the happiness of those who lived under them. Under the government of the Lombards (says Paulus Diaconus) no violence was committed, no one unjustly dispossessed of his property, none oppressed with taxes; theft, robberies, murder, and adultery, were seldom heard of: every one went, without the least apprehension, wherever he pleased. Their laws were so just and equitable, that they were retained in Italy, and observed there some ages after their kingdom was at an end.—According to Paulus Diaconus, also, their dress was loose, and for the most part of linen, such as the Anglo-Saxons wore, being interwoven with various colours; that their shoes were open to the end of their foot, and that they used to button or lace them. From some ancient paintings, it appears, that they shaved the back part of their heads, but that their hair was long before; their locks being parted, and laid on each side their foreheads.

LOMBART, or LOMBARD, PETER, an engraver of considerable eminence, who flourished about the year 1660. He was a native of Paris, where he learned the art of engraving. It appears that he came to England before the Revolution, because some of his plates for English publications are dated prior to that event. He executed a vast variety of plates, as well historical as emblematical; which, however, were chiefly for books. But his best works are portraits; and of these he produced a considerable number, which are esteemed. They are mostly after Vandyck.—He also engraved historical subjects, from Poussin, Raphael, Annibal Carracci, Guido, and other masters.

LOMENTACEÆ, in *Botany*, (from *lomentum*, a colour used by painters), the name of the 33d order in Linnæus's Fragments of a Natural Method, consisting of the following genera, many of which furnish beautiful tinctures that are used in dyeing, viz. adenanthera, bauhinia, cæsalpina, cassia, ceratonia, cercis, gleditsia, guilandina, hæmatoxylon, hymenæa, mimosa, parkinsonia, poinciana, polygama. See BOTANY.

LOCH-LOMOND, a large lake of Dunbarton or Lennox-shire in Scotland, of which Mr Pennant gives the following description. "Loch-Lomond, the last, the most beautiful of the Caledonian lakes. The first view of it from Tarbet presents an extensive serpentine winding amidst lofty hills; on the north, barren, black, and rocky, which darken with their shade that contracted part of the water. On the west side, the mountains are clothed near the bottoms with woods of oak quite to the water edge; their summits lofty, naked, and craggy. On the east side, the mountains are equally high; but the tops form a more even ridge parallel to the lake, except where Benlomond, like Saul amidst his companions, overtops the rest. The upper parts were black and barren; the lower had great marks of fertility, or at least of industry, for the yellow corn was finely contrasted with the verdure of the groves intermixed with it.

"This eastern boundary is part of the Grampian hills, which extend from hence through the counties of Perth, Angus, Mearns and Aberdeen. The road runs sometimes through woods; at others is exposed and naked; in some, so steep as to require the support of a wall; the whole the work of the soldiery: blessed exchange of instruments of destruction for those that give safety to the traveller, and polish to the once inaccessible native! Two great headlands covered with trees separate the first scene from one totally different; the last is called the *Point of Firkin*. On passing this cape an expanse of water bursts at once on your eye, varied with all the softer beauties of nature. Immediately beneath is a flat covered with wood and corn: beyond, the headlands stretch far into the water, and consist of gentle risings; many have their surfaces covered with wood, others adorned with trees loosely scattered either over a fine verdure or the purple bloom of the heath. Numbers of islands are dispersed over the lake, of the same elevated form as the little capes, and wooded in the same manner; others just peep above the surface, and are tufted with trees; and numbers are so disposed as to form magnificent vistos between.

Loch-Lomond, Lomonozof.

"Opposite Luss, at a small distance from shore, is a mountainous isle almost covered with wood; it is near half a mile long, and has a most fine effect. I could not count the number of islands, but was told there are 28; the largest two miles long, and stocked with deer.

"The length of this charming lake is 24 miles; its greatest breadth 8; its greatest depth, which is between the point of Firkin and Benlomond, is 120 fathoms. Besides the fish common to the lochs are guiniads, called here *poans*.

"The surface of Loch-Lomond has for several years past been observed gradually to increase, and invade the adjacent shore: and there is reason to suppose that churches, houses, and other buildings, have been lost in the water. Near Luss is a large heap of stones at a distance from the shore, known by the name of the old church; and about a mile to the south of that, in the middle of a large bay, between Camstraddan and the isle Inch-tavanack, is another heap, said to have been the ruins of a house. To confirm this, it is evident by a passage in Camden's Atlas Britannica, that an island, existing in his time, is now lost; for he speaks of the isle of Camstraddan, placed between the lands of the same name and Inch-tavanack, in which, adds he, was an house and orchard. Besides this proof, large trees with their branches still adhering are frequently found in the mud near the shore, overwhelmed in former times by the increase of water. This is supposed to be occasioned by the vast quantities of stone and gravel that are continually brought down by the mountain rivers, and by the falls of the banks of the Leven; the first filling the bed of the lake, the last impeding its discharge through the bed of the river."

LOMONOZOF, a celebrated Russian poet, the great refiner of his native tongue, was the son of a dealer in fish at Kolmogori: he was born in 1711, and was fortunately taught to read; a rare circumstance at that time for a person of his station in Russia. His natural genius for poetry was first kindled by the perusal of the Song of Solomon, done into verse by Polotski, whose rude compositions, perhaps scarcely superior to our version of the psalms by Sternhold and Hopkins, inspired him with such an irresistible passion for the muses, that he fled from his father, who was desirous of compelling him to marry, and took refuge in the Kaikonospaski monastery at Moscow; there he had

Lomonozof. had an opportunity of indulging his taste for letters and of studying the Greek and Latin languages. In this seminary he made so considerable progress in polite literature, as to be noticed and employed by the Imperial Academy of Sciences. In 1736 he was sent at the expence of that society, to the university of Marpurg in Hesse Cassel, where he became a scholar of the celebrated Christian Wolf, under whom he studied universal grammar, rhetoric, and philosophy. He continued at Marpurg four years, during which time he applied himself with indefatigable diligence to chemistry, which he afterwards pursued with still greater success, under the famous Henckel at Freyberg in Saxony. In 1741 he returned into Russia; was chosen in 1742 adjunct to the Imperial Academy; and in the ensuing year member of that society and professor of chemistry. In 1760 he was appointed inspector of the seminary then annexed to the academy; in 1764 he was gratified by the late empress with the title of counsellor of state, and died April 4th that year, in the 54th year of his age. Lomonozof excelled in various kinds of composition: but his chief merit, by which he bears the first rank among the Russian writers, is derived from his poetical compositions, the finest of which are his odes. The first was written in 1739, while he studied in Germany, upon the taking of Kotschin, a fortress in Crim Tartary, by Marshal Munich. The odes of Lomonozof are greatly admired for originality of invention, sublimity of sentiment, and energy of language; and compensate for the turgid style which, in some instances, has been imputed to them, by that spirit and fire which are the principal characteristics in this species of composition. Pindar was his great model; and if we may give credit to a person well versed in the Russian tongue, he has succeeded in this daring attempt to imitate the Theban bard, without incurring the censure of Horace. In this, as well as several other species of composition, he enriched his native language with various kinds of metre, and seems to have merited the appellation bestowed upon him of the *Father of Russian Poetry*. A brief recapitulation of the principal works of Lomonozof, which were printed in three volumes octavo, will serve to show the versatility of his genius, and his extensive knowledge in various branches of literature. The first volume, besides a Preface on the advantages derived to the Russian tongue from the ecclesiastical writings, contains ten sacred and nineteen panegyric odes, and several occasional pieces of poetry. The second comprises An Essay in Prose on the Rules for Russian Poetry; Translation of a German Ode; Idylls; Tamira and Selim, a tragedy; Demophoon, a tragedy; Poetical Epistle on the Utility of Glass; two cantos of an epic poem, entitled, Peter the Great; A Congratulatory Copy of Verses; An Ode; Translation of Baptist Rousseau's Ode *Sur le Bonheur;* Heads of a Course of Lectures on Natural Philosophy; certain passages translated in verse and prose, according to the original, from Cicero, Erasmus, Lucian, Ælian, Ammianus Marcellinus, Quintus Curtius, Homer, Virgil, Martial, Ovid, Horace, and Seneca, which Russian translations were brought as examples in his Lectures upon Rhetoric; lastly, Description of the Comet which appeared in 1744. The third volume consists chiefly of Speeches and Treatises read before the Academy; Panegyric on the Empress Elizabeth; on Peter the Great; Treatise on the Advantages of Chemistry; on the Phenomena of the Air occasioned by the Electrical Fire, with a Latin translation of the same; on the Origin of Light as a new Theory of Colours; Methods to determine with precision the course of a Vessel; on the origin of Metals by the means of Earthquakes; Latin Dissertation on Solidity and Fluidity; on the Transit of Venus in 1761, with a German translation. Besides these various subjects, Lomonozof made no inconsiderable figure in history, having published two small works relative to that of his own country. The first, styled Annals of the Russian Sovereigns, is a short chronology of the Russian monarchs; and the second is, the Ancient History of Russia, from the Origin of that Nation to the Death of the Great Duke Yaroslaf I. in 1054; a performance of great merit, as it illustrates the most difficult and obscure period in the annals of this country.

Lomonozof, London.

LONDON.

LONDON, a large city of Middlesex in England, the metropolis of Great Britain, and one of the most wealthy and populous cities in the world, is situated on the river Thames, in 51° 31′ north latitude, 400 miles south of Edinburgh, and 270 south-east of Dublin; 180 miles west of Amsterdam, 210 north-west of Paris, 500 south-west of Copenhagen, 600 north-west of Vienna, 790 south-west of Stockholm, 800 north-east of Madrid, 820 north-west of Rome, 850 north-east of Lisbon, 1360 north-west of Constantinople, and 1414 south-west of Moscow.

Its different names.

This city was by the Romans first called *Londinium* or *Lundinum*, as we find it in Tacitus, Ptolemy, Antoninus, and Ammianus. That name was afterwards changed into *Augusta*. How long this name prevailed, is not certainly known; but after the establishment of the Saxons we find it called *Caer Lundain, Lundoun Byrig, Lunden Ceaster, Lunden-wye, Lundenne, Lunden-berh* or *Lundenburg;* since the Conquest the records call it *Londinia, Lundonia, Londine, Londres;* and, for several ages past, it has been called *London*, a manifest corruption from Tacitus's *Londinium*. The most probable derivation of these names appears to be, either from the British words *lhong*, "a ship," and *din*, "a town," i. e. a town or harbour for ships; or from *Llin*, "a lake," i. e. *Llin din*, "the town upon the lake," the Surry side being supposed, upon very probable grounds, to have been anciently a great expanse of water.

When founded.

Londinium, however, was not the primitive name of this famous place, which existed before the invasion of the Romans; being, at the time of Cæsar's arrival in the island, the capital of the *Trinobantes* or *Trinouantes*. The name of this nation, as appears from Baxter's British Glossary, was derived from the three following British words, *tri*, *nou*, *hant*, which signify the "inhabitants of the new city." This name, it is supposed,

History. supposed, might have been given them by their neighbours, on account of their having newly come from the continent into Britain, and having there founded a city called *tri-now*, or the "new city;" the most ancient name of the renowned metropolis of Britain. The Trinobantes had come so lately from Belgium, that they seem scarcely to have been firmly established in Britain at the time of the first Roman invasion: For their new city, which soon after became so famous, was then so inconsiderable, that it is not mentioned by Cæsar, though he must have been within sight of the place where it was situated. His silence about this place, indeed, is brought as a proof that he did not cross the Thames; while Norden by the *firmissima civitas* of the Trinobantes understands the city in question, the Trinobantes themselves having been among the first of the British states who submitted to that conqueror.

Henry's Hist. vol. i. p. 171.

By Ptolemy, and some other ancient writers of good authority, indeed, Londinium is placed in Cantium, or Cent, on the south side of the Thames; and it is the opinion of some moderns, that the Romans probably had a station there, to secure their conquests on that side of the river, before they reduced the Trinobantes. The place fixed upon for this station is St George's Field, a large plat of ground situated between Lambeth and Southwark, where many Roman coins, bricks, and chequered pavements, have been found. Three Roman ways from Kent, Surry, and Middlesex, intersected each other in this place; this therefore is supposed to be the original Londinium, which it is thought became neglected after the Romans reduced the Trinobantes, and settled on the other side of the Thames; and the name was transferred to the new city.

3 When taken possession of by the Romans.

The Romans possessed themselves of London, on their second invasion in the reign of Claudius, about 105 years after their first under Cæsar. They had begun with Camelodunum, the present Maldon in Essex; and having taken it, planted there a colony consisting of veterans of the 14th legion. London and Verulam were next taken possession of about one and the same time. Camelodunum was made a *colonia* or place governed entirely by Roman laws and customs; Verulam (on the site of which St Alban's now stands), a *municipium*, in which the natives were honoured with the privileges of Roman citizens, and enjoyed their own laws and constitutions; and Londinium only a *præfectura*, the inhabitants, a mixture of Romans and Britons, being suffered to enjoy no more than the name of citizens of Rome, being governed by prefects sent annually from thence, without having either their own laws or magistrates. "It was even then of such concourse (says Mr Pennant), and such vast trade, that the wise conquerors did not think fit to trust the inhabitants with the same privileges as other places of which they had less reason to be jealous." But others observe, that this is a mistake; and that the Romans, in order to secure their conquest, and to gain the affections of those Britons who had already submitted to their authority, made London equally a municipium or free city with Verulamium, as may be seen by referring to Aulus Gellius, lib. xvi. c. 13. and to Spanhem. orbis Roman. tom. ii. p. 37, 38.

4 Ancient commerce of London.

It is difficult to say what were the particular articles of commerce exported from and imported into the port of London at this period. The imports and exports of the island in general we know: Strabo says, "Britain produceth corn, cattle, gold, silver, iron; besides which, skins, slaves, and dogs, naturally excellent hunters, are exported from that island." It is probable that the two first and three last articles were exported from London; and perhaps, too, the *gagates* or jet-stone mentioned by Solinus as one of the productions of Britain, together with horses, were exported from thence. The imports were at first salt, earthen ware, and works in brass, polished bits of bones emulating ivory, horse collars, toys of amber, glasses, and other articles of the same material. History.

In the reign of Nero, as Tacitus informs us, London was become a city highly famous for the great conflux of merchants, her extensive commerce, and plenty of all things. No fewer than seven of the fourteen itinera of Antoninus begin or end at London; which tends to corroborate the many proofs which might be adduced, that this city was the capital of Britain in the Roman times.

5 When first surrounded with walls.

At first London had no walls or other fortifications to defend it, and was therefore exposed to the attacks of every enemy; and thus it suffered severely about the year 64, being burnt by the Britons under Boadicea, and all the inhabitants massacred. But it was soon restored by the Romans; and increased so much, that in the reign of the emperor Severus it is called by Herodian a *great and wealthy city*. It continued, however, in a defenceless state for more than a century after this last period; when at last a wall of hewn stone and British bricks was erected around it.

London at this time extended in length from Ludgate-hill to a spot a little beyond the Tower. The breadth was not half equal to the length, and at each end grew considerably narrower. Maitland ascribes the building of the walls to Theodosius governor of Britain in 369. Dr Woodward, with more probability, supposes them to have been founded under the auspices of Constantine the Great: and this seems to be confirmed by the numbers of coins of that emperor's mother Helena, which have been discovered under them, placed there by him in compliment to her. The same emperor made it a bishop's see; for it appears that the bishops of London and York, and another English bishop, were at the council of Arles in the year 314: he also settled a mint in it, as is plain from some of his coins.

6 Their ancient course, &c.

The ancient course of the wall was as follows: It began with a fort near the present site of the Tower, was continued along the Minories, and the back of Houndsditch, across Bishopsgate-street, in a straight line by London wall to Cripplegate; then returned southward by Crowder's Well alley (where several remnants of lofty towers were lately to be seen), to Aldersgate, thence along the back of Bull-and-Mouth-street to Newgate, and again along the back of the houses in the Old Bailey to Ludgate; soon after which, it probably finished with another fort, where the house, late the king's printing house, in Black Friars, now stands: from hence another wall ran near the river side, along Thames-street, quite to the fort on the eastern extremity. The walls were three miles a hundred and sixty-five feet in circumference, guarded at proper distances on the land side with fifteen lofty towers; some of them were remaining

History. maining within these few years, and possibly may still. Maitland mentions one twenty-six feet high, near Gravel-lane, on the west side of Houndsditch; another, about eighty paces south-east towards Aldgate; and the bases of another, supporting a modern house, at the lower end of the street called the Vinegar-yard, south of Aldgate. The walls, when perfect, are supposed to have been twenty-two feet high, the towers forty. These, with the remnants of the wall, proved the Roman structure, by the titles and disposition of the masonry. London-wall, near Moorfields, is now the most entire part left of that ancient precinct. The gates which received the great military roads, were four. The Prætorian way, the Saxon Watling-street, passed under one, on the site of the late Newgate; vestiges having been discovered of the road in digging above Holburn-bridge: it turned down to Dowgate, or more properly Dwr-gate or Water-gate, where there is a trajectus or ferry, to join it to the Watling-street, which was continued to Dover. The Herman-street passed under Cripplegate; and a vicinal way went under Aldgate by Bethnal-green, towards Oldford, a pass over the river Lee to Duroleiton, the modern Leiton in Essex.

7 London submits to the Saxons. After the Romans deserted Britain, a new and fierce race succeeded. The Saxons, under their leaders Hengist and Horsa, landed in 448, having been invited over by the provincials as auxiliaries against the Scots and Piets; but quarrelling with their friends, they found means to establish themselves in the island, and in process of time entirely subdued them, as related under the article ENGLAND, N° 31—44. London fell into the hands of these invaders about the year 457; and became the chief city of the Saxon kingdom in Essex. It suffered much in the wars carried on between the Britons and Saxons: but it soon recovered; so that Bede calls it a *princely mart town*, under the government of a chief magistrate, whose title of *portgrave* or *portreve*, (for we find him called by both names), conveys a grand idea of the mercantile state of London in those early ages, that required a governor or guardian of the port. During the civil wars of the Saxons with each other, the Londoners had always the address to keep themselves neuter; and about the year 819, when all the seven Saxon kingdoms fell under the power of Egbert, London became the metropolis of England, which it has ever since continued.

8 Plundered by the Danes. During the invasions of the Danes, London suffered greatly. In 849, these invaders entered the Thames with 250 ships, plundered and burnt the city, and massacred the inhabitants; and two years after they returned with a fleet of 350 sail, fully determined to destroy every thing that had escaped their barbarity in the former expedition. At this time, however, they were disappointed; most of their troops being cut in pieces by King Ethelwolf and his son Athelbald; yet such was the destruction made by those barbarians at London, that it suffered more from these two incursions than ever it had done before.

9 Recovers under Alfred the Great. In the reign of King Alfred the Great, London began to recover from its former ruinous state. He rebuilt its walls, drove out the Danish inhabitants who had settled there, restored the city to its former liberties and beauty, and committed the care of it to his son-in-law, Ethelred duke of Mercia, in hopes that this might always be a place of secure retreat within its strong walls, whatever might happen from a foreign or domestic enemy. In 893, however, he had the mortification to see his capital totally reduced to ashes by an accidental fire, which could not be extinguished, as the houses at that time were all built of wood. The walls, however, being constructed of incombustible materials, continued to afford the same protection as before; the houses were quickly rebuilt, and the city divided into wards and precincts, for its better order and government. This king also instituted the office of sheriff, the nature of which office made it necessary to have it also in London; so that here we have the glimmerings of the order of magistrates afterwards settled in the city of London: in the person of the portreve, or portgrave, or governor of the city, as supreme magistrate; in the sheriff, and in the officer or subordinate magistrate by what name soever then distinguished, which, being placed at the head of each ward or precinct, were analogous to the more modern title of *aldermen* and *common-council men*.

History.

10 Reduced to ashes.

11 Its government settled.

12 Brick and stone houses first erected. Alfred having settled the affairs of England in the most prudent manner, directed his attention to the ornamenting, as much as possible, the city of London. For this purpose, he spirited up the English to an emulation in building their houses of stronger and more durable materials than formerly. At that time their houses were mostly of wood; and a house built of any other materials was looked upon as a kind of wonder. But Alfred having begun to raise his palaces of stone and brick, the opulent Londoners, and the nobility resident in and about London, followed the example, though the custom did not come into general use till some ages after.

13 Besieged by Canute. In 1015, a foreign enemy again appeared before London. Canute king of Denmark having invaded and plundered the counties of Dorset, Somerset, and Wilts, sailed up the Thames with 200 ships, and laid siege to the city. The citizens continued faithful, notwithstanding the defection of the greatest part of the kingdom; and made such a brave resistance, that Canute thought fit to withdraw his army, leaving only his fleet to blockade the city by water, that when he found a fair opportunity he might renew the siege with better success. At last, however, being defeated in several battles by Edmund Ironside, he was obliged to call off his ships to cover his own army in case of necessity. In the compromise, however, which was afterwards made between Edmund and Canute, the city of London was given to the latter, and owned him for its lawful sovereign. We have a strong proof of the opulence of London even at this time, from the tax laid upon it by Canute in order to pay his army: this being no less than 10,500l. while the rest of the nation was at the same time taxed only at 72,000l.

14 Sends representatives to parliament. In 1046, we have the first instance of the Londoners sending representatives to parliament. This happened on settling the succession to the throne after Canute's death. The English in general declared for Edward, son of King Ethelred; or, if that could not be carried, for Hardicanute, son of Canute by Queen Emma, and then about on a tour to Denmark. The city of London espoused the claim and interest of Harold Harefoot, son also of Canute, by Queen Elvira

History. of Northampton. Edward's party soon declined; and the Londoners agreed, for the peace of the realm, that the two brothers should divide the kingdom between them; but as Hardicanute did not return in proper time to England, a *witiena-gemote* was held at Oxford, where Earl Leofric, and most of the thanes on the north of the Thames, with the pilots of London, chose Harold for their king. Here, by pilots we are to understand the directors, magistrates, or leading men of the city: and this manifestly shows, that London was then of such consequence, that no important national affair was transacted without the consent of the inhabitants; for the Saxon annals assure us, that none were admitted into this assembly of election but the nobility and the pilots of London.

15 Suffers greatly by fires, hurricanes, &c.

On the invasion of the Normans under William I. London submitted as well as the rest of the kingdom; and received two charters from that prince, confirming all the privileges they had under the Saxon kings, and adding several new ones. But while the citizens were promising themselves all manner of security and tranquillity under the new government, it was almost entirely reduced to ashes by an accidental fire in 1077. It had scarce recovered from this calamity, when it was visited by another of the same kind in 1086, which began at Ludgate, and destroyed the best and most opulent part of the city; consuming, among other buildings, the cathedral of St Paul's; which, however, was soon rebuilt more magnificently than before. Under the reign of William Rufus, London suffered considerably by fires, hurricanes, and inundations, and seems to have been depressed by the tyranny of that prince; but Henry I. granted large immunities to the city, which again revived its trade, and was favourable to the progress of the arts. The king, however, still retained the privilege of appointing the portreve, or chief magistrate; but the immunities granted to the Londoners secured their affections, and tended much to secure him on the throne. At the same time, there was such a plenty of all kinds of provisions, that as much corn was sold for 1s. as would suffice 100 people for a day; 4d. would purchase as much hay and corn as would maintain 20 horses for a day; and a sheep could be bought for a groat.

16 Monstrous licentiousness of the Normans.

Henry thought proper also to check the licentious behaviour of the Normans, which, by the favour showed them under the two Williams, had carried them into the most barbarous practices. Those who followed William Rufus in his excursions, harassed and plundered the country at discretion. Many of them were so extravagant in their barbarity, that what they could not eat or drink in their quarters, they either obliged the people to carry to market and sell for their use, or else they would throw it into the fire: and, at their going off, they frequently washed their horses heels with the drink, and staved the casks containing the remainder. King Henry resolved to put a stop to these excesses and savage customs; and therefore published a proclamation at London, commanding that thenceforward all persons who should be convicted of such barbarities should have their eyes pulled out, or their hands or feet cut off, as the ministers of justice should think fit. This effectually checked the insolence of the Normans, and the city continued to flourish throughout the reigns of Henry I. and Stephen.

The attachment of the citizens to Stephen, however, History. was a crime which never could be forgiven by Henry II. and, of consequence, he made them sensible of his displeasure, by making frequent demands of money from them. About this time, indeed, the Londoners were 17 Of the Londoners. arrived at such a pitch of licentiousness, that their prosperity seemed a curse rather than a blessing. The sons of the most eminent and wealthy citizens entered into a confederacy to commit burglaries, and to rob and murder all that came in their way in the night-time. The king took an opportunity from these irregularities to enrich himself. He demanded several loans and free gifts; till at last the Londoners, to prevent further inquiries into their conduct, paid into the exchequer 5000l. in three years. These disorders, however, were at last stopped by the execution of John Senex; who, though a very rich and reputable citizen, had engaged in these enterprises. He offered 500lb. weight of silver, a prodigious sum in those days, for his pardon, but was refused. The king, however, still continued to drain the citizens of their money by free gifts; and at last fined every separate guild, fraternity, or company, that had presumed to act as bodies corporate without the royal letters-patent.

On the death of Henry II. the title of the first magistrate of London was changed from *portgreve* to that of *bailiff*; and in 1189 claimed and acted in the office of the *chief butler* at the coronation of Richard I. In 1191 this monarch permitted the bailiff, named *Henry Fitz-Alwine*, to assume the title of *mayor*. For, in 1192, we find certain orders of the mayor and aldermen to prevent fires; whereby it was ordained, that "all houses thereafter to be erected in London and the liberties thereof, should be built of stone, with party-walls of the same; and covered either with slates or tiles, to prevent those dreadful calamities by fire, which were frequently and chiefly occasioned by houses built of wood, and thatched with straw or reeds." And for this purpose, it was also provided by the discreeter men of the city, "that 12 aldermen of the city should be chosen in full hustings, and there sworn to assist the mayor in appeasing contentions that might arise among neighbours in the city upon enclosure betwixt land and land, and to regulate the dimensions of party-walls, which were to be of stone, 16 feet high and three feet thick; and to give directions about girders, windows, gutters, and wells." Such confidence also did Richard put in the wisdom and faithfulness of the city of London, that when it was resolved to fix a standard for weights and measures for the whole realm, his majesty committed the execution thereof to the sheriffs of London and Middlesex, whom he commanded to provide measures, gallons, iron rods, and weights, for standards, to be sent to the several counties of England. This happened in 1198, at which time corn was advanced to the enormous price of 18s. 4d. per quarter.

18 The office of mayor when first instituted.

19 Favours granted to the city by King John.

The city of London was much favoured by King John, who granted them three charters soon after his accession. The first was a recital and confirmation of those granted by Henry I. and II. with the farther privilege of being free from toll and every other duty or custom in his majesty's foreign dominions; for which they paid the sum of 3000 merks. The second was a confirmation of one granted by King Richard.

By

History. By this the citizens of London had the jurisdiction and conservancy of the river Thames; with a clause to extend that jurisdiction, and the powers therewith granted, to the river Medway; and with another clause to enable the said city, as conservators of the rivers Thames and Medway, to inflict a penalty of 10l. upon any person that should presume to erect a wear in either of these rivers. The third charter contains a fee-farm-rent of the sheriffwicks of London and Middlesex at the ancient rent, of which they had been deprived by Queen Maud; granting them also the additional power of choosing their own sheriffs. This charter was given by way of conveyance from the crown to the citizens for a valuable consideration, by which the sheriffwick became their freehold; and this is the first covenant or conveyance we find on record with the legal terms of *to have and to hold*, which are at this time accounted an essential part in all conveyances of property.

20 London oppressed by Henry III. During the reign of Henry III. the city of London was oppressed in many different ways. In 1218, he exacted a fine of 40 marks for selling a sort of cloth not two yards within the lists; and a 15th of the citizens personal estates for the enjoyment of their ancient rights and privileges. In 1221, he commanded by proclamation all the foreign merchants to depart the city, which drew 30 marks from the Hanseatic company of the *Steelyard*, to have seisin of their guild or hall in Thames-street. But it was the wrestling match at St Giles's in the fields that brought on their greatest burden. In the year 1221, on St James's day, the citizens of London having carried off the victory from the people of Westminster and other neighbouring villages, the steward of the abbot of Westminster, meditating revenge against the Londoners, proposed another wrestling match with them, and gave a ram for the prize. The citizens resorted to the place at the time appointed; but were unexpectedly assaulted by a great number of armed men, who killed and wounded many, and dispersed the rest. This raised a great commotion in the city. The populace breathed revenge; and, by the instigation of Constantine Fitz-Arnulph, a great favourer of the French party during the troubles in King John's reign, they proceeded to Westminster, and pulled down the houses both of the steward and abbot. Hearing afterwards that the abbot was come into the city with his complaint to Philip d'Aubney the king's counsel, they pursued him, beat his servants cruelly, took away 12 of his horses, and would have murdered himself, had he not escaped by a back-door. Upon this tumult, Hubert de Bury, then chief justiciary, summoned the mayor and many of the principal citizens to attend him in the tower of London; and inquiring for the authors of the riot, Constantine, the ringleader, boldly answered, that "he was one; that they had done no more than they ought; and that they were resolved to avow what they had done, let the consequence be what it would." In this he was seconded by his nephew and one Geoffrey: but the justiciary, having dismissed all the rest, detained these three, and ordered them to be hanged next morning, though Constantine offered 15,000 marks for his pardon. Hubert then coming into the city with a strong guard, caused the hands and feet of most of the principal rioters he could seize to be cut off: all which was executed without any legal proceedings or form of trial. After these arbitrary cruelties, he degraded the mayor and all the magistrates; placed a *custos* over the city, and obliged 30 persons of his own choosing to become securities for the good behaviour of the whole city. Several thousand marks were also exacted by the king, before he would consent to a reconciliation. History.

This arbitrary conduct alarmed the whole nation. The parliament of 1224 began to be uneasy for themselves, and addressed his majesty that he would be pleased to confirm the charter of liberties which he had sworn to observe; and the consequence of this application was a confirmation of the magna charta in the full parliament at Westminster in the year 1225. At this time, also, the rights and privileges of the citizens were confirmed. They were exempted from prosecution for burels, i. e. listed cloth; and were granted the right of having a common seal. The necessitous circumstances of this monarch, however, made him often exact money arbitrarily as long as he lived.

Under the succeeding reigns, as the liberty of the people in general was augmented, so the liberty, opulence, and power of the citizens of London, increased, until they became a kind of balance to the power of the crown itself, which in some measure they still continue to be. Riots indeed, for which they generally suffered, were by no means unfrequent; the city often suffered by fires and plagues. Nothing, however, happened which materially affected the welfare of the city, till the reign of Charles II. in 1665.—This year London was ravaged by the most violent plague ever known in Britain. The whole summer had been remarkably still and warm, so that the weather was sometimes suffocating even to people in perfect health; and by this unusual heat and sultry atmosphere, people were undoubtedly prepared for receiving the infection, which appeared with violence in the months of July, August, and September. A violent plague had raged in Holland in the year 1663; on which account the importation of merchandise from that country was prohibited by the British legislature in 1664. Notwithstanding this prohibition, however, it seems the plague had actually been imported; for in the close of the year 1664, two or three persons died suddenly in Westminster, with marks of the plague on their bodies. Some of their neighbours, terrified at the thoughts of their danger, removed into the city; but their removal proved too late for themselves, and fatal to those among whom they came to reside. They soon died of the plague; and communicated the infection to so many others, that it became impossible to extinguish the seeds of it, by separating those that were infected from such as were not. It was confined, however, through a hard frosty winter, till the middle of February, when it again appeared in the parish of St Giles's, to which it had been originally brought; and, after another long rest till April, showed its malignant force afresh, as soon as the warmth of the spring gave it opportunity. —At first, it took off one here and there, without any certain proof of their having infected each other, and houses began to be shut up, with a design to prevent its spreading. But it was now too late; the infection gained ground every day, and the shutting up of houses only made the disease spread wider. People, 21 Dreadful plague in 1665.

afraid

History. afraid of being shut up, and sequestered from all communication with society, concealed their illness, or found means to escape from their places of confinement; while numbers expired in the greatest torments, destitute of every assistance; and many died both of the plague and other diseases, who would in all probability have recovered, had they been allowed their liberty, with proper exercise and air.—A house was shut up on account of a maid-servant, who had only spots, and not the gangrenous plague-blotches, upon her, so that her distemper was probably a petechial fever. She recovered; but the people of the house obtained no liberty to stir, either for air or exercise, for 40 days. The bad air, fear, anger, and vexation, attending this injurious treatment, cast the mistress of the family into a fever. The visitors appointed to search the house, said it was the plague, though the physicians were of a different opinion: the family, however, were obliged to begin their quarantine anew though it had been almost expired before; and this second confinement affected them so much, that most of the family fell sick, some of one distemper and some of another. Every illness that appeared in the family produced a fresh prolongation of their confinement; till at last the plague was actually brought in by some of those who came to inquire into the health of the family, and almost every person in the house died.—Many examples of a similar kind happened, and this was one of the worst consequences of shutting up houses. All means of putting a stop to the infection were evidently ineffectual. Multitudes fled into the country; many merchants, owners of ships, &c. shut themselves up, on board their vessels, being supplied with provisions from Greenwich, Woolwich, and single farm houses on the Kentish side. Here, however, they were safe; for the infection never reached below Deptford, though the people went frequently on shore to the country towns, villages, and farm houses, to buy fresh provisions. As the violence of the plague increased, the ships which had families on board removed farther off; some went quite out to sea, and then put into such harbours and roads as they could best get at.

In the mean time, the distemper made the most rapid advances within the city. In the last week of July, the number of burials amounted to 2010; but the first week of August it rose to 3817; thence to 3880; then to 4237; the next week, to 6102; and at last to 7000 and 8000 weekly. In the last week of September, however, the fury of the disease began to abate; though vast numbers were sick, yet the number of burials decreased from 7155 to 5538; the next week there was a farther decrease to 4929, then to 4327, next to 2665, then to 1421, and the next week to 1031.

All this while, the poor people had been reduced to the greatest distresses, by reason of the stagnation of trade, and the sicknesses to which they were peculiarly liable on account of their manner of living. The rich, however, contributed to their subsistence in a most liberal manner. The sums collected on this occasion are indeed almost incredible; being said to amount to 100,000l. per week. The king is reported to have contributed 1000l. weekly; and in the parish of Cripplegate alone, 17,000l. was distributed weekly among the poor inhabitants.—By the vigilance also of the magistrates, provisions continued remarkably cheap throughout the whole time of this dreadful calamity, so that all riots and tumults on that account were prevented; and at last, on the cessation of the disease in the winter of 1665, the inhabitants who had fled returned to their habitations, and London to appearance became as populous as ever, though it was computed that 100,000 persons had been carried off by the plague. History.

22 Account of the great fire in 1666.

The city was scarcely recovered from the desolation occasioned by the plague, when it was almost totally laid in ashes by a most dreadful fire. This broke out in a baker's shop in Pudding-lane, on Saturday night, September 2. 1666. In a few hours Billingsgate ward was entirely burnt down; and before morning the fire had crossed Thames-street, and destroyed the church of St Magnus. From thence it proceeded to the bridge, and consumed a great pile of buildings there; but was stopped by the want of any thing more to destroy. The flames, however, being scattered by a strong east wind, continued their devastations in other quarters, All efforts to stop it proved unsuccessful throughout the Sunday. That day it proceeded up as far as Garlick-hithe; and destroying Canon street, invaded Cornhill and the Exchange. On Monday, the flames having proceeded eastward against the wind through Thames-street, invaded Tower street, Gracechurch-street, Fenchurch-street, Dowgate, Old Fish-street, Watling-street, Threadneedle-street, and several others, from all which it broke at once into Cheapside. In a few hours Cheapside was all in flames, the fire having reached it from so many places at once. The fire then continuing its course from the river on one side, and from Cheapside on the other, surrounded the cathedral of St Paul's. This building stood by itself at some distance from any houses; yet such was the violence of the flames, and the heat of the atmosphere occasioned by them, that the cathedral took fire at top. The great beams and massy stones broke through into Faith-church underneath, which was quickly set on fire; after which, the flames invaded Pater-noster-row, Newgate-street, the Old Bailey, Ludgate-hill, Fleet-street, Ironmonger-lane, Old Jewry, Laurence-lane, Milk-street, Wood-street, Gutter-lane, Foster-lane, Lothbury, Cateaton-street; and, having destroyed Christ-church, burnt furiously through St Martin's le Grand towards Aldersgate.

The fire had now attained its greatest extent, and was several miles in compass. The vast clouds of smoke obscured the sun so, that he either could not be seen at all, or appeared through it as red as blood. The flames reached an immense way up into the air, and their reflection from the smoke, which in the night-time seemed also like flame, made the appearance still more terrible. The atmosphere was illuminated to a great extent, and this illumination is said to have been visible as far as Jedburgh in Scotland. Some of the light ashes also are said to have been carried to the distance of 16 miles. Guildhall exhibited a singular appearance. The oak with which it was built was so solid, that it would not flame, but burnt like charcoal, so that the building appeared for several hours like an enchanted palace of gold or burnished brass.

At last, on Wednesday morning, when every one expected

History. expected that the suburbs as well as the city were to have been burnt, the fire began of itself to abate by reason of the wind having ceased, and some other changes no doubt taken place in the atmosphere. It was checked by the great building in Leadenhall-street, and in other streets by the blowing up several houses with gun-powder; and on Thursday the flames were quite extinguished.—The following is a calculation of the damage done by this extraordinary conflagration.

23 Calculation of the damage done.

Thirteen thousand two hundred houses, at 12 years purchase, supposing the rent of each 25l. sterling,	L. 3,960,000
Eighty-seven parish churches, at 8000l.	696,000
Six consecrated chapels, at 2000l,	12,000
The royal exchange - -	50,000
The custom-house - - -	10,000
Fifty-two halls of companies, at 1500l. each - - - - -	78,000
Three city gates, at 3000l. each -	9000
Jail of Newgate - - -	15,000
Four stone bridges - - -	6000
Sessions house - - -	7000
Guildhall, with the courts and offices belonging to it - - -	40,000
Blackwell hall - - - -	3000
Bridewell - - - - -	5000
Poultry compter - - - -	5000
Woodstreet compter - - -	3000
St Paul's church - - -	2,000,000
Wares, household stuff, money, and moveable goods lost or spoiled	2,000,000
Hire of porters, carts, waggons, barges, boats, &c. for removing goods	200,000
Printed books and paper in shops and warehouses - - -	150,000
Wine, tobacco, sugar, &c. of which the town was at that time very full - - - - - -	1,500,000
	L. 10,689,000

It was never certainly known whether this fire was accidental or designed. A suspicion fell upon the Papists; and this gained such general credit, that it is asserted for a truth on the monument which is erected in memory of the conflagration. Of the truth of this assertion, however, though there was not sufficient proof, it had the effect of making the Papists most violently suspected and abhorred by the Protestants, which some time after proved very prejudicial to the city itself.

From this calamity, great as it was, London soon recovered itself, and became much more magnificent than before; the streets, which were formerly crooked and narrow, being now built wide and spacious; and the industry of its inhabitants repaired the losses they had sustained. In 1679, the city was again alarmed by the discovery of a design to destroy it by fire a second time. Elizabeth Oxly, servant to one Rind in Fetter-lane, having set her master's house on fire, was apprehended on suspicion, and confessed, that she had been hired to do it by one Stubbs a Papist, for a reward of 5l. Stubbs being taken into custody, acknowledged that he had persuaded her to it; and that he himself had been prevailed upon by one Father Gifford his confessor, who had assured him, that by burning the houses of heretics he would do a great service to the church. He also owned that he had several conferences with Gifford and two Irishmen on the affair. The maid and Stubbs also agreed in declaring, that the Papists intended to rise in London, expecting to be powerfully supported by a French army. In consequence of this discovery, the Papists were banished from the city, and five miles round, and five Jesuits were hanged for the above-mentioned plot.

24 A design to set it on fire again.

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The Papists thought to revenge themselves by forging what was called the *meal-tub plot*, in which the Presbyterians were supposed to hatch treacherous designs against the life of the king. Sir Edmondbury Godfrey also, who had been very active in his proceedings against the Papists, was murdered by some unknown persons; and this murder, together with their discovering the falsehood of the meal-tub plot, so exasperated the Londoners, that they resolved to show their detestation of Popery, by an extraordinary exhibition on the 17th of November, Queen Elizabeth's accession to the throne, on which day they had usually burnt the pope in effigy. The procession began with a person on horseback personating Sir Edmondbury Godfrey, attended by a bellman proclaiming his execrable murder. He was followed by a person carrying a large silver cross, with priests in copes, Carmelites, and Gray-friars, followed by six Jesuits: then proceeded divers waiters, and after them some bishops with lawn sleeves, and others with copes and mitres. Six cardinals preceded the pope, enthroned in a stately pageant, attended by divers boys with pots of incense, and the devil whispering in his ear. In this order they marched from Bishopsgate to Fleet-street; and there, amidst a great multitude of spectators, committed his holiness to the flames.

25 Which gives occasion to a quarrel with the court.

This procession gave great offence to the court, at which the duke of York, afterwards James II. had a great influence. The breach was farther widened by the choice of sheriffs for that year. The candidates set up by the court were rejected by a majority of almost two to one; but this did not deter their party from demanding a poll in their behalf, upon which a tumult ensued. This was represented by the Popish party in such colours to the king, that he issued out a commission that same evening for trying the rioters; which, however, was so far from intimidating the rest, that they grew more and more determined, not only to oppose the Popish party, but to exclude the duke of York from his succession to the crown.

In the mean time, the king prorogued the parliament, to prevent them from proceeding in their inquiry concerning the Popish plot, and the exclusion-bill. Upon this the lord-mayor, aldermen, and common-council, presented a petition to his majesty, in which they requested, that he would permit the parliament to sit in order to complete their salutary measures and councils. This petition was highly resented by the king; who, instead of granting it, dissolved the parliament, and could never afterwards be reconciled to the city. From this time it was determined to seize their charter; and fresh provocations having

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having been given about the election of sheriffs, a *quo warranto* was at last produced by the attorney-general, in order to overthrow their charter, and thereby to deprive the citizens of the power to choose sheriffs. This information set forth, "That "the mayor and commonalty and citizens of the city of London, by the space of a month then last past and more, used, and yet do claim to have and use, without any lawful warrant or legal grant, within the city of London aforesaid, and the liberties and privileges of the same city, the liberties and privileges following, viz. 1. To be of themselves a body corporate and politic, by the name of *mayor and commonalty and citizens of the city of London*. 2. To have sheriffs *civitat. et. com. London. et com. Middlesex*, and to name, make, and elect, and constitute them. 3. That the mayor and aldermen of the said city should be justices of the peace, and hold sessions of the peace. All which liberties, privileges, and franchises, the said mayor and commonalty, and citizens of London, upon the king did by the space aforesaid usurp, and yet do usurp."

26 A *Quo Warranto* granted against the city.

Though nothing could be more unjust than this prosecution, the ministry were determined at all events to crush the Londoners; rightly judging, that it would be an easy matter to make all other corporations surrender their charters into the king's hands, and that they had no other body in the nation to fear. Accordingly they displaced such judges as would not approve of their proceedings; and, on the 12th of June 1683, Justice Jones pronounced the following sentence: "That a city might forfeit its charter; that the malversations of the common-council were acts of the whole city; and that the points set forth in the pleadings were just grounds for the forfeiting of a charter."

Notwithstanding this sentence, however, the attorney-general, contrary to the usual custom in such cases, was directed to move that the judgment might not be recorded: being afraid of the consequences. Yet it was judged that the king might seize the liberties of the city. A common-council was immediately summoned to deliberate on this exigency. The country party moved to have the judgment entered; but they were overruled by the court party, who insisted upon an absolute submission to the king before judgment was entered; and though this was in effect a voluntary surrender of the city-liberties, and deprived themselves of the means of getting the judgment reversed, the act of submission was carried by a great majority: and in a petition from the lord mayor, aldermen, and common-council, they "acknowledged their own misgovernment, and his majesty's lenity; begged his pardon, and promised constant loyalty and obedience; and humbly begged his majesty's commands and directions." To this his majesty answered, that he would not reject their suit, if they would agree upon the following particulars. 1. That no lord mayor, sheriff, recorder, common serjeant, town clerk, or coroner, of the city of London, or steward of the borough of Southwark, shall be capable of, or admitted to, the exercise of their respective offices before his majesty shall have approved of them under his sign-manual. 2. That if his majesty shall disapprove the choice of any person to be lord major, and signify the same under his sign-manual to the lord mayor, or in default of a lord mayor, to the recorder or senior alderman, the citizens shall, within one week, proceed to a new choice: and if his majesty shall in like manner disapprove the second choice, his majesty may, if he pleases, nominate a person to be lord mayor for the year ensuing. 3. If his majesty shall, in like manner, disapprove the persons chosen to be sheriffs, or either of them, his majesty may appoint sheriffs for the year ensuing. 4. That the lord mayor and court of aldermen may, with the leave of his majesty, displace any alderman, recorder, &c. 5. Upon the election of an alderman, if the court of aldermen shall judge and declare the person presented to be unfit, the ward shall choose again; and upon a disapproval of a second choice, the court may appoint another in his room. 6. That the justices of the peace should be by the king's commission; and the settling of those matters to be left to his majesty's attorney-general and counsel learned in the law."

27 Conditions of reconciliation between the king and city.

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To these the lord-keeper added, in the king's name, "That these regulations being made, his majesty would not only pardon this prosecution, but would confirm their charter in such a manner as should be consistent with them; concluding thus: "My lord mayor, the term draws towards an end, and Midsummer-day is at hand, when some of the officers used to be chosen; whereof his majesty will reserve the approbation. Therefore, it is his majesty's pleasure, that you return to the city, and consult the common council, that he may speedily know your resolutions thereupon, and accordingly give his directions. That you may see the king is in earnest, and the matter is not capable of delay, I am commanded to let you know he hath given orders to his attorney-general to enter upon judgment on Saturday next; unless you prevent it by your compliance in all these particulars."

A common-council was summoned, when the friends of liberty treated those slavish conditions as they deserved; and even declared, that they were ready to sacrifice all that was near or dear to them, rather than submit to such arbitrary impositions: but when it was put to the vote, there appeared a majority of 18 for submission.

Thus the king got the government of the city into his own hands, though he and his brothers entirely lost the affections of the Londoners. But, not content with their submission, his majesty departed from his promise; commanded the judgment upon the *quo warranto* to be entered; and commissioned Sir William Pritchard, the lord mayor, to hold the same office during his majesty's pleasure. In the same manner he appointed or displaced the other magistrates as he thought proper; after which the ministry, having nothing to fear, proceeded in the most arbitrary manner.

28 The king breaks his promise.

In this subjection to the will of the court, the city of London continued till the Revolution; but, in 1689, the immediate restoration of the Londoners to their franchises was ordered; and in such a manner and form, as to put it out of the powers of an arbitrary ministry and a corrupt judge and jury to deprive them of their chartered liberties for the time to come. Accordingly a bill was brought into parliament, and passed, for reversing the judgment of the *quo warranto* against the city of London, and for restoring the same to its ancient rights

29 Privileges of the city restored.

General Description.

rights and privileges. Since that time the city of London hath enjoyed tranquillity; its commerce hath been carried to the highest pitch; and for the politeness, riches, and number of its inhabitants, as well as its extent and the magnificence of its buildings, is inferior to no city in Europe, if not superior to every one.

30 Description of the city.

That part of this immense capital which is distinguished by the name of *The City*, stands on the north shore of the river, from the Tower to the Temple, occupying only that space formerly encompassed by the wall, which in circumference measures but three miles and 165 feet. In this wall there were seven gates by land, viz. Ludgate, Aldgate, Cripplegate, Aldersgate, Moorgate, Bishopsgate, which were all taken down in September 1760; and Newgate, the county gaol, which was also taken down in 1776, and a massive building erected a little south of it, which by the rioters in 1780 received damage to the amount of 80,000l. On the side of the water there were Dowgate and Billingsgate, long since demolished, as well as the postern-gate near the Tower. In the year 1670, there was a gate erected called *Temple-Bar*, which terminates the bounds of the city westward. The *liberties*, or those parts of this great city which are subject to its jurisdiction, and lie without the walls of London, are bounded on the east, in Whitechapel, the Minories, and Bishopsgate, by bars, which were formerly posts and chains, that were frequently taken away by arbitrary power, when it was thought proper to seize the franchises of the city of London; on the north, they are bounded in the same manner in Pickaxe-street, at the end of Fan-alley, and in St John's-street: on the west, by bars in Holborn: at the east end of Middle Row, and at the west end of Fleet-street, by the gate called *Temple-Bar*, already mentioned: on the south, we may include the jurisdiction which the city holds on the river Thames, and over the borough of Southwark.

The city, including the borough, is at present divided into 26 wards.

31 Division into wards.

1. *Aldersgate ward* take its name from a city-gate which lately stood in the neighbourhood. It is bounded on the east by Cripplegate ward; on the west, by Farringdon ward within and without; and on the south, by Farringdon ward within. It is very large, and is divided into Aldersgate-within and Aldersgate-without. Each of these divisions consists of four precincts, under one alderman, eight common-council men, of whom two are the alderman's deputies, eight constables, fourteen inquest-men, eight scavengers, and a beadle; exclusive of the officers belonging to the liberty of St Martin's le Grand, which contains 168 houses.

2. *Aldgate* takes its name also from a gate, which was of great antiquity, being mentioned in King Edgar's charter to the knights of the Knighton Guild about the year 967; and was probably of a much more ancient foundation, for it was the gate through which the Roman vicinal way lay to the ferry at Oldford. In the time of the wars betwixt King John and his barons, the latter entered the city through this gate, and committed great devastations among the houses of the religious. Aldgate was rebuilt by the leaders of the party after the Roman manner. They made use of stone which they brought from Caen, and a small brick called the *Flanders tile*, which Mr Pennant thinks has been often mistaken for Roman. The new gate was very strong, and had a deep well within it. In 1471, this gate was assaulted by the Bastard of Falconbridge, who got possession of it for a few hours; but the portcullis being drawn up, the troops which had entered were all cut off, and the citizens, headed by the alderman of the ward and recorder, having made a sally, defeated the remainder with great slaughter. In 1606, Aldgate was taken down and rebuilt; and many Roman coins were found in digging the foundations.—The ward of Aldgate is bounded on the east by the city wall, which divides it from Portsoken ward; on the north, by Bishopsgate ward; on the west, by Lime-street and Langbourn wards; and on the south, by Tower-street ward. It is governed by an alderman, six common-council men, six constables, twenty inquest-men, seven scavengers, and a beadle; besides the officers belonging to St James's, Duke's Place.—It is divided into seven precincts.

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3. *Bassishaw* or *Basinghall ward*, is bounded on the east and south by Coleman-street ward, on the north by part of Cripplegate, and on the west by part of the wards of Cheap and Cripplegate. On the south, it begins at Blackwell-hall; and runs northward to London wall, pulled down some time ago to make way for new buildings in *Fore-street*, and spreads 88 feet east, and 54 feet west against the place where that wall stood. This is a very small ward, and consists only of two precincts: the upper precinct contains no more than 66, and the lower only 76 houses. It is governed by an alderman, four common-council men, of whom one is the alderman's deputy, three constables, seventeen inquest-men, three scavengers, and a beadle. It has its name from Basinghall, the mansion-house of the family of *Basings*, which was the principal house in it, and stood in the place of Blackwell-hall.

4. *Billingsgate ward* is bounded on the east by Tower-street ward; on the north, by Langbourn ward; on the west, by the ward of Bridge-within; and on the south, by the river Thames. There have been many conjectures concerning the origin of the name of *Billingsgate*, none of which seems to be very well authenticated. It is, for instance, supposed to have derived its name from a British king named *Belinus*, said to have been an assistant of Brennus king of the Gauls at the taking of Rome, and is the same with the *Beli-Maur* mentioned in the Welsh genealogies. The name of *Ludgate* is said to be derived from his son *Lud*.—It is divided into 12 precincts; and is governed by an alderman, 10 common-council men, one of whom is the alderman's deputy, 11 constables, 14 inquest-men, six scavengers, and a beadle. The situation of Billingsgate, on the river, gives it great advantages with respect to trade and merchandise; so that it is well inhabited, and is in a continual hurry of business at the several wharfs or quays.

5. *Bishopsgate ward* is bounded on the east by Aldgate ward, Portsoken ward, and part of the Tower-liberty, or Norton-falgate; on the west, by Broad-street ward and Moorfields; and on the south, by Langbourn ward.

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ward. It is very large, and divided into Bishopsgate-within and Bishopsgate-without. The first contains all that part of the ward within the city-wall and gate, and is divided into five precincts; the second lies without the wall, and is divided into four precincts. Bishopsgate-without extends to Shoreditch, taking its name from one Sir John de Sorditch, an eminent lawyer much in favour with King Edward III. both on account of his knowledge in the law, and of his personal valour. In the time of Henry VIII. one Barlo, a citizen and inhabitant of this place, was named *duke of Shoreditch*, on account of his skill in archery; and, for a number of years after, the title belonged to the captain of the London archers. This ward is governed by an alderman, two deputies, one within and the other without, 12 common-council men, seven constables, 13 inquest-men, nine scavengers, and two beadles. It took its name from the gate which has been pulled down to make that part of the city more airy and commodious. This gate was built by Erkenwald bishop of London in 675; and it is said to have been repaired by William the Conqueror soon after the Norman conquest. In the time of Henry III. the Hanse merchants had certain privileges confirmed to them, in return for which they were to support this gate; and in consequence of this they rebuilt it elegantly in 1479. There were two statues of bishops, in memory of the founder and first repairer; other two were also put up, which are supposed to have been designed for Alfred and Ældred earl of Mercia, to whose care the gate had been committed.

6. *Bread-street ward* is encompassed on the north and north-west, by the ward of Farringdon-within; on the east by Cordwainers ward; on the south by Queenhithe ward; and on the west, by Castle-Baynard ward. It is divided into 13 precincts; and is governed by an alderman, 12 common-council men, of whom one is the alderman's deputy, 13 constables, 13 inquest-men, 13 scavengers, and a beadle; and yet contains no more than 331 houses. It takes its name from the ancient bread-market, which was kept in the place now called *Bread-street*; the bakers being obliged to sell their bread only in the open market and not in shops.

7. *Bridge-ward-within* is bounded on the south by the river Thames and Southwark; on the north, by Langbourn and Bishopsgate ward; on the east, by Billingsgate; and on the west, by Candlewick and Dowgate wards. It is divided into 14 precincts, three of which were on London bridge; and is governed by an alderman, 15 common-council men, one of whom is the alderman's deputy, 14 constables, 15 inquest-men, 14 scavengers, and a beadle. It takes its name from its connexion with London bridge.

8. *Broad-street ward* is bounded, on the north and east, by Bishopsgate ward; on the south, by Cornhill and Wallbrook ward; and on the west by Coleman-street ward. It is divided into 10 precincts; and governed by an alderman, 10 common-council men, one of whom is the alderman's deputy, 10 constables, 13 inquest men, eight scavengers, and a beadle. It has its name from that part of it now distinguished by the name of *Old Broad-street*; and which, before the fire of 1666, was accounted one of the broadest streets in London.

9. *Candlewick ward*, *Candlewick-street*, or *Candlewright-street ward* as it is called in some ancient records, is bounded on the east by Bridge ward; on the south, by Dowgate and part of Bridge ward; on the west, by Dowgate and Wallbrook; and on the north, by Langbourn ward. It is but a small ward, consisting of about 280 houses; yet is divided into seven precincts. It is governed by an alderman, eight common-council men, of whom one is the alderman's deputy, seven constables, 13 inquest-men, seven scavengers, and a beadle. It has its name from a street, formerly inhabited chiefly by candle-wrights or candle-makers, both in tallow and wax: a very profitable business in the times of Popery, when incredible quantities of wax candles were consumed in the churches. That street, however, or at least its name, *Candlewick*, is lost since the great conflagration, for which the name *Canon-street* is substituted, the candle wrights being at that time burnt out and dispersed through the city.

10. *Castle-Baynard ward* is bounded by Queenhithe and Bread-street wards on the east; on the south, by the Thames; and on the west and north by the ward of Farringdon-within. It is divided into 10 precincts, under the government of an alderman, 10 common-council men, one of whom is the alderman's deputy, nine constables, 14 inquest-men, seven scavengers, and a beadle. It takes its name from a castle built on the bank of the river by one Baynard, a soldier of fortune, who came in with William the Conqueror, and was by that monarch raised to great honours and authority.

11. *Cheap ward* is bounded on the east by Broad-street and Wallbrook wards; on the north, by Coleman-street, Bassishaw, and Cripplegate; and on the south, by Cordwainers ward. It is divided into nine precincts; and is governed by an alderman, 12 common-council men, of whom one is the alderman's deputy, 11 constables, 13 inquest-men, nine scavengers, and a beadle. It has its name from the Saxon word *chepe*, which signifies a market, kept in this division of the city, now called *Cheapside*: but then known by the name of *Westcheap*, to distinguish it from the market then also kept in Eastcheap, between Canon or Candlewick-street and Tower-street.

12. *Coleman-street ward* is bounded on the east by Bishopsgate, Broad-street, and Cheap wards; on the north, by Cripplegate ward, Middle Moorfields, and Bishopsgate; on the south, by Cheap ward; and on the west, by Bassishaw ward. It is divided into six precincts; and is governed by an alderman, six common-council men, one of whom is the alderman's deputy, six constables, 13 inquest-men, six scavengers, and a beadle. The origin of the name is not certainly known.

13. *Cordwainers ward* is bounded on the east by Wallbrook, on the south by Vintry ward, on the west by Bread-street, and on the north by Cheap ward. It is divided into eight precincts; and is governed by an alderman, eight common council men, one of whom is the alderman's deputy, eight constables, 14 inquest-men, eight scavengers, and a beadle. Its proper name is *Cordwainers-street ward*; which it has from Cordwainers-street, now Bow-lane, formerly occupied chiefly

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chiefly by shoemakers and others that dealt or worked in leather.

14. *Cornhill ward* is but of small extent. It is bounded on the east by Bishopsgate, on the north by Broad-street, on the north by Cheap ward, and on the south by Langbourn ward. It is divided into four precincts, which are governed by one alderman, six common-council men, of whom one is the alderman's deputy, four constables, 16 inquest-men, four scavengers, and a beadle. It takes its name from the principal street in it, known from the earliest ages by the name of *Cornhill*, because the corn-market was kept there.

15. *Cripplegate ward* is bounded on the east by Moorfields, Coleman-street ward, Bassishaw ward, and Cheap ward; on the north by the parish of St Luke's, Old-street; on the west, by Aldersgate ward; and on the south, by Cheap ward. It is divided into 13 precincts, nine within and four without the wall; and is governed by an alderman, 12 common-council men, of whom two are the alderman's deputies, 13 constables, 34 inquest-men, 16 scavengers, and three beadles. It takes its name from Cripplegate, which stood on the north-west part of the city wall. It was an old plain structure, void of all ornament, with one postern; but had more the appearance of a fortification than any of the other gates. It was removed in order to widen the entrance into Wood-street, which, by the narrowness of the gateway, was too much contracted and rendered dangerous for passengers and great waggons.

16. *Dowgate ward* is bounded on the east by Candlewick and Bridge wards, on the north by Wallbrook ward, on the west by Vintry ward, and on the south by the Thames. It is divided into eight precincts, under the government of an alderman, eight common-council men, of whom one is the alderman's deputy, eight constables, 15 inquest-men, five scavengers, and a beadle. It has its name from the ancient water gate, called *Dourgate*, which was made in the original wall that ran along the north side of the Thames, for the security of the city against all attempts to invade it by water.

17. *Farringdon ward within* is bounded on the east by Cheap ward and Baynard-castle ward; on the north, by Aldersgate and Cripplegate wards, and the liberty of St Martin's le Grand; on the west by Farringdon-without; and on the south by Baynard-castle ward and the river Thames. It is divided into 18 precincts; and governed by one alderman, 17 common-council men, of whom one is the alderman's deputy, 19 constables, 17 inquest men, 19 scavengers, and two beadles. It takes its name from William Farringdon, citizen and goldsmith of London, who, in 1279, purchased all the aldermanry with the appurtenances, within the city of London and suburbs of the same, between Ludgate and Newgate, and also *without* these gates.

18. *Farringdon ward without* is bounded on the east by *Farringdon within*, the precinct of the late priory of St Bartholomew near Smithfield, and the ward of Aldersgate; on the north, by the Charter-house, the parish of St John's Clerkenwell, and part of St Andrew's parish without the freedom; on the west, by High Holborn and St Clement's parish in the Strand; and on the south by the river Thames. It is governed by one alderman, 16 common-council men, of whom two are the alderman's deputies, 23 constables, 48 inquest-men, 24 scavengers, and four beadles. It takes its name from the same goldsmith who gave name to Farringdon within.

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19. *Langbourn ward* is bounded on the east by Aldgate ward, on the north, by part of the same, and Lime-street ward; on the south, by Tower-street, Billingsate, Bridge, and Candlewick wards; and on the west by Wallbrook. It is divided into 12 precincts. It had its name from a rivulet or long bourn of fresh water, which anciently flowed from a spring near Magpye alley adjoining to St Catherine Coleman's church.

20. *Lime-street ward* is bounded on the east and north by Aldgate ward, on the west by Bishopsgate; and on the south by Langbourn ward. It is divided into four precincts; and governed by an alderman, four common-council men, one of whom is the alderman's deputy, four constables, 13 inquest-men, four scavengers, and a beadle. It is very small, and has its name from some lime kilns that were formerly built in or near Lime-street.

21. *Portsoken ward* is bounded on the east by the parishes of Spitalfields, Stepney, and St George's in the east; on the south, by Tower-hill, on the north, by Bishopsgate ward, and on the west by Aldgate ward. It is divided into five precincts; and is governed by an alderman, five common-council men, one of whom is the alderman's deputy, five constables, 19 inquest-men, five scavengers, and a beadle. Its name signifies the *franchise of the liberty gate*. This Portsoken was for some time a guild; and had its beginning in King Edgar, when 13 knights, "well beloved of the king and realm, for services by them done," requested to have a certain portion of land on the east part of the city, left desolate and forsaken of the inhabitants by reason of too much servitude. They besought the king to have this land, with the liberty of a guild for ever. The king granted their request on the following conditions, viz. that each of them should victoriously accomplish three combats, one above the ground, one under ground, and the third in the water: and after this, at a certain day, in East Smithfield, they should run with spears against all comers. All this was gloriously performed; upon which the king named it *Knighten Guild*, and extended it from Aldgate to the places where the bars now are on the east, and to the Thames on the south, and as far into the water as an horseman could ride at low water and throw his spear.

22. *Queenhithe ward* is bounded on the east by Dowgate, on the north by Bread-street and Cordwainers wards, on the south by the Thames, and on the west by Castle-Baynard ward. It is divided into nine precincts; and is governed by one alderman, six common-council men, one of whom is the alderman's deputy, and nine constables. It has its name from the *hithe*, or harbour for large boats, barges, and lighters; for which, and even for ships, it was the anchoring place, and the quay for loading and unloading vessels almost of any burden used in ancient times. It has the name of *queen*, because the queens of England usually possessed the tolls and customs of vessels that unloaded goods at this hithe, which were very considerable.

23. *Tower ward*, or *Tower-street ward*, is bounded on the south by the river Thames, on the east by Tower-hill

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Tower-hill and Aldgate ward, on the north by Langbourn ward, and on the west by Billingsgate ward. It is governed by one alderman, 12 common-council men, of whom one is the alderman's deputy, 12 constables, 13 inquest-men, 12 scavengers, and one beadle. It takes its name from *Tower-street*, so called because it leads out of the city in a direct line to the principal entrance of the Tower of London,

24. *Vintry ward* is bounded on the east by Dowgate, on the south by the Thames, on the west by Queenhithe ward, and on the north by Cordwainers ward. It is a small ward, containing only 418 houses; but is divided into nine precincts, and governed by an alderman, nine common-council men, one of whom is the alderman's deputy, nine constables, 13 inquest-men, three scavengers, and a beadle. It takes its name from the vintners or wine-merchants of Bourdeaux, who formerly dwelt in this part of the city, were obliged to land their wines on this spot, and to sell them in 40 days, till the 28th of Edward I.

25. *Wallbrook ward* is bounded on the east by Langbourn, on the south by Dowgate ward, on the west by Cordwainers ward, and on the north by Cheap ward. It is small, containing only 306 houses; but is divided into seven precincts, and governed by an alderman, eight common-council men, of whom one is the alderman's deputy, seven constables, 13 inquest-men, six scavengers, and a beadle. It has its name from the rivulet *Wall-brook*, that ran down the street of this name into the river Thames near Dowgate; but in process of time it was so lost by covering it with bridges, and buildings upon those bridges, that its channel became a common sewer.

26. The ward of *Bridge-without* includes the borough of Southwark, and the parishes of Rotherhithe, Newington, and Lambeth. It has its name from London bridge, with the addition of the word *without*, because the bridge must be passed in order to come at it. *Westminster* is generally reckoned a part of London, though under a distinct government; and has long been famous for the palaces of our kings, the seat of our law tribunals, and of the high court of parliament; all which shall be described in their order.

32 Government of London.

The city and liberties of London are under an ecclesiastical, a civil, and a military government.

33 Ecclesiastical.

As to its *ecclesiastical* government, London is a bishop's see, the diocese of which comprehends not only Middlesex, Essex, and part of Hertfordshire, but the British plantations in America. The bishop of London takes precedency next to the archbishops of Canterbury and York; but the following parishes of this city are exempt from his jurisdiction, being peculiars under the immediate government of the archbishop of Canterbury; viz. All-hallows in Bread street, All-hallows, Lombard-street; St Dionys Back-church, St Dunstan in the East, St John Baptist, St Leonard Eastcheap, St Mary Aldermary, St Mary Bothaw, St Mary le Bow, St Michael Crooked-lane, St Michael Royal, St Pancras Soper-lane, and St Vedast Foster-lane.

34 Civil.

The *civil* government of London divides it into wards and precincts, under a lord mayor, aldermen, and common-council.

35 Lord Mayor.

The mayor, or lord mayor, is the supreme magistrate, chosen annually by the citizens, pursuant to a charter of King John. The present manner of electing a lord mayor is by the liverymen of the several companies, assembled in Guildhall annually on Michaelmas-day, according to an act of common council in A. D. 1476, where, and when, the liverymen choose, or rather nominate, two aldermen below the chair, who have served the office of sheriff, to be returned to the court of aldermen, who may choose either of the two; but generally declare the senior of the two, so returned, to be lord mayor elect. The election being over, the lord mayor elect, accompanied by the recorder and divers aldermen, is soon after presented to the lord chancellor (as his majesty's representative in the city of London) for his approbation; and on the 9th of November following is sworn into the office of mayor at Guildhall; and on the day after, before the barons of the exchequer at Westminster; the procession on which occasion is exceedingly grand and magnificent. Government.

The lord mayor sits every morning at the mansion-house, or place where he keeps his mayoralty, to determine any difference that may happen among the citizens, and to do other business incident to the office of a chief magistrate. Once in six weeks, or eight times in the year, he sits as chief judge of oyer and terminer, or gaol-delivery of Newgate for London and the county of Middlesex. His jurisdiction extends all over the city and suburbs, except some places that are exempt. It extends also from Colneyditch, above Staines-bridge in the west, to Yendale, or Yenflete, and the mouth of the river Medway, and up that river to Upnor-castle, in the east: by which he exercises the power of punishing or correcting all persons that shall annoy the streams, banks, or fish. For which purpose his lordship holds several *courts of conservancy* in the counties adjacent to the said river, for its conservation, and for the punishment of offenders. See the article MAYOR'S *Court*.

36 Aldermen.

The title of dignity, *alderman*, is of Saxon original, and of the greatest honour, answering to that of earl; though now it is nowhere to be found but in chartered societies. And from hence we may account for the reason why the aldermen and commonalty of London were called *barons* after the Conquest. These magistrates are properly the subordinate governors of their respective wards under the lord mayor's jurisdiction; and they originally held their aldermanries either by inheritance or purchase; at which time the aldermanries or wards changed their names as often as their governors or aldermen. The oppressions, to which the citizens were subject from such a government, put them upon means to abolish the perpetuity of that office; and they brought it to an actual election. But that manner of election being attended with many inconveniences, and becoming a continual bone of contention among the citizens, the parliament, 17 Richard II. A. D. 1394, enacted, that the aldermen of London should continue in their several offices during life or good behaviour. And so it still continues: though the manner of electing has several times varied. At present it is regulated by an act of parliament, passed in the year 1724-5: and the person so elected is to be returned by the lord mayor (or other returning officer in his stead, duly qualified to hold a court of wardmote) to the court of lord mayor and aldermen, by whom the person

Government. person so returned must be admitted and sworn into the office of alderman before he can act. If the person chosen refuseth to serve the office of alderman, he is finable 500l.

These high officers constitute a second part of the city legislature when assembled in a corporate capacity, and exercise an executive power in their respective wards. The aldermen who have passed the chair, or served the high office of lord mayor, are justices of the quorum; and all the other aldermen are not only justices of the peace, but by the statute of 43 Eliz. entitled, *An act for the relief of the poor*, "every alderman of the city of London, within his ward, shall and may do and execute, in every respect, so much as is appointed and allowed by the said act to be done or executed by one or *two* justices of peace of any county within this realm." They every one keep their *wardmote*, or *court*, for choosing ward officers and settling the affairs of the ward, to redress grievances, and to present all defaults found within their respective wards.

37 Common-council. The next branch of the legislative power in this city is the *common-council*. The many inconveniences that attended popular assemblies, which were called *folkmote*, determined the commonalty of London to choose representatives to act in their name and for their interest, with the lord mayor and aldermen, in all affairs relating to the city. At first these representatives were chosen out of the several companies: but that not being found satisfactory, nor properly the representatives of the whole body of the inhabitants, it was agreed to choose a certain number of discreet men out of each ward: which number has from time to time increased according to the dimensions of each ward: and at present the 25 wards, into which London is divided, being subdivided into 236 precincts, each precinct sends a representative to the common-council, who are elected after the same manner as an alderman, only with this difference, that as the lord mayor presides in the wardmote, and is judge of the poll at the election of an alderman, so the alderman of each ward is judge of the poll at the election of a common-council man.

Thus the lord mayor, aldermen, and common-council, when assembled, may be deemed the city parliament, resembling the great council of the nation. For it consists of two houses; one for the lord mayor and aldermen, or the upper house; another for the commoners or representatives of the people, commonly called the *common-council men*. And they have power in their incorporate capacity to make and repeal bye-laws; and the citizens are bound to obey or submit to those laws. When they meet in their incorporate capacity, they wear deep blue silk gowns: and their assemblies are called the *court of common-council*, and their ordinances *acts of common-council*. No act can be performed in the name of the city of London without their concurrence. But they cannot assemble without a summons from the lord mayor; who, nevertheless, is obliged to call a common-council, whenever it shall be demanded, upon extraordinary occasions, by six reputable citizens and members of that court.

38 Sheriffs. This corporation is assisted by two sheriffs and a recorder. The sheriffs are chartered officers, to perform certain suits and services, in the king's name, within the city of London and county of Middlesex, chosen by the liverymen of the several companies on Midsummer day. Their office, according to Camden, in general, is to collect the public revenues within their several jurisdictions; to gather into the exchequer all fines belonging to the crown; to serve the king's writs of process; to attend the judges, and execute their orders; to impannel juries; to compel headstrong and obstinate men by the *posse comitatus* to submit to the decisions of the law; and to take care that all condemned criminals be duly punished and executed. In particular, in London, they are to execute the orders of the common-council, when they have resolved to address his majesty, or to petition parliament. Government.

The sheriffs, by virtue of their office, hold a court at Guildhall every Wednesday and Friday, for actions entered at Wood-street Compter; and on Thursdays, and Saturdays, for those entered at the Poultry Compter: of which the sheriffs being judges, each has its assistant, or deputy, who are called the judges of those courts; before whom are tried actions of debt, trespass, covenant, &c. and where the testimony of any absent witness in writing is allowed to be good evidence. To each of these courts belong four attorneys, who, upon their being admitted by the court of aldermen, have an oath administered to them.

To each of these courts likewise belong a secondary, a clerk of the papers, a prothonotary, and four clerks-sitters. The secondary's office is to allow and return all writs brought to remove clerks out of the said courts; the clerk of the papers files and copies all declarations upon actions; the prothonotary draws and engrosses all declarations; the clerk-sitters enter actions and attachments, and take bail and verdicts. To each of the compters, or prisons belonging to these courts, appertain 16 serjeants at mace, with a yeoman to each, besides inferior officers, and the prison-keeper.

In the sheriffs court may be tried actions of debt, case, trespass, account, covenant, and all personal actions, attachments, and sequestrations. When an erroneous judgment is given in either of the sheriffs courts of the city, the writ of error to reverse this judgment must be brought in the court of hustings before the lord mayor; for that is the superior court. The sheriffs of London may make arrests and serve executions on the river Thames.

39 Recorder. We do not read of a recorder till the 1304, who, by the nature of his office, seems to have been intended as an assistant to, or assessor with, the lord mayor, in the execution of his high office, in matters of justice and law. He is chosen by the lord mayor and aldermen only; and takes place in all courts, and in the common-council, before any one that hath not been mayor. Of whom we have the following description in one of the books of the chamber: "He shall be, as is wont to be, one of the most skilful and virtuous apprentices of the law of the whole kingdom; whose office is always to sit on the right hand of the mayor, in recording pleas, and passing judgments; and by whom records and processes, had before the lord mayor and aldermen at Great St Martin's, ought to be recorded by word of mouth before the judges assigned there to correct errors. The mayor and aldermen have therefore used commonly to set forth all other businesses, touching the city, before the king and his

Government. council, as also in certain of the king's courts, by Mr Recorder, as a chief man, endued with wisdom, and eminent for eloquence."—Mr Recorder is looked upon to be the mouth of the city, to deliver all addresses to the king, &c. from the corporation; and he is the first officer in order of precedence that is paid a salary, which originally was no more than 10l. sterling per annum, with some few perquisites; but it has from time to time been augmented to 1000l. per annum, and become the road of preferment in the law. This office has sometimes been executed by a deputy.

40 Chamberlain. The next chartered officer of this corporation is the chamberlain; an officer of great repute and trust, and is in the choice of the livery annually. This officer, though chosen annually on Midsummer-day, is never displaced during his life, except some very great crime can be made out against him. He has the keeping of the moneys, lands, and goods, of the city orphans, or takes good security for the payment thereof when the parties come to age. And to that end he is deemed in the law a sole corporation, to him and his successors, for orphans; and therefore a bond or a recognizance made to him and his successors, is recoverable by his successors. This officer hath a court peculiarly belonging to him. His office may be termed a public treasury, collecting the customs, moneys, and yearly revenues, and all other payments belonging to the corporation of the city. It was customary for government to appoint the chamberlain receiver of the land tax; but this has been discontinued for several years past.

41 Other officers. The other officers under the lord mayor are, 1. The common serjeant. He is to attend the lord mayor and court of aldermen on court days, and to be in council with them on all occasions, within or without the precincts or liberties of the city. He is to take care of orphans estates, either by taking account of them, or to sign their indentures, before their passing the lord mayor and court of aldermen. And likewise he is to set, let, and manage the orphans estates, according to his judgment, to the best advantage. 2. The town clerk; who keeps the original charter of the city, the books, rolls, and other records, wherein are registered the acts and proceedings of the city; so that he may not be improperly termed the city-register: he is to attend the lord mayor and aldermen at their courts, and signs all public instruments. 3. The city remembrancer; who is to attend the lord mayor on certain days, his business being to put his lordship in mind of the select days he is to go abroad with the aldermen, &c. He is to attend daily at the parliament house, during the sessions, and to report to the lord mayor their transactions. 4. The sword-bearer; who is to attend the lord mayor at his going abroad, and to carry the sword before him, being the emblem of justice. This is an ancient and honourable office, representing the state and princely office of the king's most excellent majesty, in his representative the lord mayor; and, according to the rule of armory, "He must carry the sword upright, the hilts being holden under his bulk, and the blade directly up the midst of his breast, and so forth between the sword-bearer's brows." 5. The common hunt; whose business it is to take care of the pack of hounds belonging to the lord mayor and citizens, and to attend them in hunting in those grounds to which they are authorized by charter. Government. 6. The common crier. It belongs to him and the serjeant at arms, to summon all executors and administrators of freemen to appear, and to bring in inventories of the personal estates of freemen, within two months after their decease: and he is to have notice of the appraisements. He is also to attend the lord mayor on set days, and at the courts held weekly by the mayor and aldermen. 7. The water bailiff; whose office is to look after the preservation of the river Thames against all encroachments; and to look after the fishermen for the preservation of the young fry, to prevent the destroying them by unlawful nets. For that end, there are juries for each county, that hath any part of it lying on the sides or shores of the said river; which juries, summoned by the water bailiff at certain times, do make inquiry of all offences relating to the river and the fish, and make their presentments accordingly. He is also bound to attend the lord mayor on set days in the week.—These seven purchase their places; except the town clerk, who is chosen by the livery.

There are also three serjeant carvers; three serjeants of the chamber; a serjeant of the channel; four yeomen of the water side; an under water bailiff; two yeomen of the chamber; two meal weighters; two yeomen of the wood wharfs; a foreign taker; city marshals. There are besides these, seven gentlemen's men; as the sword-bearer's man, the common hunt's two men, the common crier's man, and the carvers three men.

Nine of the foregoing officers have liveries of the lord mayor, viz. the sword-bearer and his man, the three carvers, and the four yeomen of the water side. All the rest have liveries from the chamber of London.

The following officers are likewise belonging to the city; farmer of the markets, auditor, clerk of the chamber, clerk to the commissioners of the sewers, clerk of the court of conscience, beadle of the same court, clerk of the city works, printer to the city, justice of the Bridge yard, clerk comptroller of the Bridge house, steward of the Borough, bailiff of the Borough.

There is also a coroner, called so from *corona*, i. e. a *crown*, because he deals principally with the crown, or in matters appertaining to the imperial crown of England. See the article CORONER.

Besides these officers, there are several courts in this city for the executing of justice, viz. the court of hustings, lord mayor's court, &c. In the city there are also two subordinate kinds of government. One executed by the aldermen, deputy, and common-council men, and their inferior officers, in each ward; under which form are comprehended all the inhabitants, free or not free of the city. Every ward is therefore like a little free state, and at the same time subject to the lord mayor as chief magistrate of the city. The housekeepers of each ward elect their representatives, the common-council, who join in making bye-laws for the government of the city. The officers and servants of each ward manage the affairs belonging to it, without the assistance of the rest; and each has a court called the *wardmote*, as has been already described, for the management of its own affairs. The other, by the master,

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master, wardens, and court of assistants, of the incorporate companies; whose power reaches no farther than over the members of their respective guilds or fraternities; except that in them is vested the power to choose representatives in parliament for the city, and all those magistrates and officers elected by a common hall; which companies are invested with distinct powers, according to the tenor of their respective charters.

42 Military government.

The *military* government of the city is lodged in a lieutenancy, consisting of the lord mayor, aldermen, and other principal citizens, who receive their authority by a commission from the king. Those have under their command the city trained bands, consisting of six regiments of foot, distinguished by the names of the *white*, *orange*, *yellow*, *blue*, *green*, and *red*, each containing eight companies of 150 men, amounting in all to 7200. Besides these six regiments, there is a corps called the *artillery company*, from its being taught the military exercise in the artillery ground. This company is independent of the rest, and consists of 700 or 800 volunteers. All these, with two regiments of foot of 800 men each, commanded by the lieutenant of the Tower of London, make the whole militia of this city; which, exclusive of Westminster and the borough of Southwark, amounts to about 10,000 men.

43 Trading companies.

The *trading part* of the city of London is divided into 89 companies; though some of them can hardly be called so, because they have neither charters, halls, nor liveries. Of these 89 companies, 55 have each a hall for transacting the business of the corporation; and this consists of a master or prime warden, a court of assistants and livery.—Twelve of these companies are superior to the rest both in antiquity and wealth; and of one of those 12 the lord mayors have generally made themselves free at their election. These companies are the mercers, grocers, drapers, fish-mongers, goldsmiths, skinners, merchant-taylors, haberdashers, salters, iron-mongers, vintners, and clothworkers.—The principal incorporated societies of the merchants of this city are, the Hamburgh Company, the Hudson's Bay Company, the Russia Company, the Turkey Company, the East India Company, the Royal African Company, the South Sea Company, and some Insurance Companies. The most of these companies have stately houses for transacting their business, particularly the East India and South Sea Companies. See COMPANY.

44 Remarkable streets and buildings within the City.

The streets and public buildings in London and its liberties being far too numerous for a particular description in this work, we shall only select the most remarkable, beginning with *London Bridge* as the most ancient, and proceeding in our survey through the wards into which the city is divided.

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45 London bridge.

I. *Remarkable Buildings*, &c. *in the* CITY.—The original bridge, which stands in Bridge ward, was of wood, and appears to have been first built between the years 993 and 1016; but being burnt down about the year 1136, it was rebuilt of wood in 1163. The expences, however, of maintaining and repairing it became so burdensome to the inhabitants of the city, that they resolved to build a stone bridge a little westward of the wooden one. This building was begun in 1176, and finished in 1209; and was 915 feet long, 44 feet high, and 73 feet wide; but houses being built on each side, the space between was only 23 feet.

This great work was founded on enormous piles driven as closely as possible together: on their tops were laid long planks 10 inches thick, strongly bolted; and on them was placed the base of the pier, the lowermost stones of which were bedded in pitch, to prevent the water from damaging the work: round all were the piles which were called the *sterlings*, designed for the preservation of the foundation piles. These contracted the space between the piers so greatly, as to occasion at the retreat of every tide a fall of five feet, or a number of temporary cataracts, which since the foundation of the bridge have occasioned the loss of many thousand lives. The number of arches was 19, of unequal dimensions, and greatly deformed by the sterlings and the houses on each side, which overhung and leaned in a most terrific name. In most places they hid the arches, and nothing appeared but the rude piers. Within recollection, frequent arches of strong timber crossed the street from the tops of the houses to keep them together, and from falling into the river (A). Nothing but use could preserve the quiet of the inmates, who soon grew deaf to the noise of the falling waters, the clamours of watermen, or the frequent shrieks of drowning wretches. In one part had been a drawbridge, useful either by way of defence or for the admission of ships into the upper part of the river. This was protected by a strong tower. It served to repulse Falconbridge the Bastard in his general assault on the city in 1471, with a set of banditti, under pretence of rescuing the unfortunate Henry, then confined in the Tower. Sixty houses were burnt on the bridge on the occasion. It also served to check, and in the end annihilate, the ill-conducted insurrection of Sir Thomas Wyat, in the reign of Queen Mary. The top of this tower, in the sad and turbulent days of this kingdom, used to be the shambles of human flesh, and covered with heads or

(A) The gallant action of Edmund Osborne, ancestor to the duke of Leeds, when he was apprentice to Sir William Hewet, cloth-worker, may not improperly be mentioned in this place. About the year 1536, when his master lived in one of those tremendous houses, a servant maid was playing with his only daughter in her arms in a window over the water, and accidentally dropt the child. Young Osborne, who was witness to the misfortune, instantly sprang into the river, and beyond all expectation, brought her safe to the terrified family! Several persons of rank paid their addresses to her when she was marriageable, among others the earl of Shrewsbury; but Sir William gratefully decided in favour of Osborne: *Osborne*, says he, *saved her, and Osborne shall enjoy her*. In her right he possessed a great fortune. He became sheriff of London in 1575, and lord mayor in 1582.

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quarters of unfortunate partizans. Even so late as the year 1598, Hentzner, the German traveller, with German accuracy, counted on it above 30 heads. The old map of the city in 1597 represents them in a most horrible cluster.—An unparalleled calamity happened on this bridge within four years after it was finished. A fire began on it at the Southwark end; multitudes of people rushed out of London to extinguish it; while they were engaged in this charitable design, the fire seized on the opposite end, and hemmed in the crowd. Above 3000 persons perished in the flames, or were drowned by overloading the vessels which were hardy enough to attempt their relief.

The narrowness of the passage on this bridge, and the straitness of the arches, having occasioned frequent and fatal accidents, the magistrates of London, in 1756 and 1758, obtained acts of parliament for improving and widening the passage over and through the bridge. In consequence of these acts of parliament, a temporary wooden bridge was built, and the houses on the old bridge were taken down. Instead of a narrow street 23 feet wide, there is now a passage of 31 feet for carriages, with a raised pavement of stone on each side 7 feet broad for the use of foot passengers. The sides are secured by stone balustrades, enlightened in the night with lamps. The passage through the bridge is enlarged by throwing the two middle arches into one, and by other alterations and improvements; notwithstanding which, however, it is still greatly subject to its former inconveniences.

46 Waterloo bridge.

The Strand or Waterloo Bridge is one of the noblest structures of the kind in the world, whether we regard the simple and chaste grandeur of its architecture, its convenience as a bridge, or the impression of indestructibility which it forces on the mind. It was begun in the year 1811, and opened in 1817, on the anniversary of the battle of Waterloo. The architect was Mr Rennie. It cost rather more than one million of money, all of which was raised by private subscription. It crosses the Thames near the Savoy to the opposite shore of Lambeth-marsh. It contains 9 equal arches, each of 127 feet span. The piers are 20 feet high; the width within the parapets 42 feet, the footpaths being 7 feet each, and the roadway 28 feet. It is perfectly flat, and is built of granite.

47 Vauxhall bridge.

The Vauxhall, which was begun nearly at the same time as the Waterloo Bridge, crosses the Thames from Milbank to the Cumberland tea-gardens near Vauxhall. It consists of 9 arches of equal span, of cast-iron. The span is 78 feet, the height 29 feet, and the breadth of the roadway 36 feet: the length is 899 feet. It was built by private subscription, and cost nearly 300,000l. A road is opened from it to Pimlico, and thus it is connected with Hyde Park corner.

48 Southwark bridge.

Southwark Bridge is not yet finished. It crosses the Thames at the bottom of Queen's Street Cheapside to Bankside. It consists of 3 arches of cast-iron. The centre arch is 240 feet span, and the side ones 210 feet each. The river here is narrow, but deep and rapid. The estimate is 287,000l. Mr Rennie is the the architect. It is building by private subscription.

49 The Monument.

Near the north side of London bridge stands the *Monument*, a beautiful and magnificent fluted column of the Doric order, built with Portland stone, and erected in memory of the conflagration 1666. It was begun by Sir Christopher Wren in 1671, and finished by him in 1677. Its height from the pavement is 202 feet; the diameter of the shaft, or body of the column, is 15 feet; the ground-plinth, or lowest part of the pedestal, is 28 feet square; and the pedestal is 40 feet high. Over the capital is an iron balcony encompassing a cone 32 feet high, which supports a blazing urn of gilt brass. Within is a large staircase of black marble, containing 345 steps, each ten inches and a half broad, and six inches thick. The west side is adorned with a curious emblem in alt-relief, denoting the destruction and restoration of the city. The first female figure represents London sitting in ruins, in a languishing posture, with her head dejected, her hair dishevelled, and her hand carelessly lying on her sword. Behind is *Time*, gradually raising her up: at her side is a woman touching her with one hand, whilst a winged sceptre in the other directs her to regard the goddesses in the clouds; one with a cornucopia, denoting *Plenty;* the other with a palm branch, the emblem of *Peace*. At her feet is a bee-hive, showing, that by industry and application the greatest misfortunes are to be overcome. Behind the figure of *Time* are citizens exulting at his endeavours to restore her; and beneath, in the midst of the ruins, is a dragon, who, as the supporter of the city arms, with his paw endeavours to preserve the same. Opposite to the city, on an elevated pavement, stands the king, in a Roman habit, with a laurel on his head, and a truncheon in his hand; and approaching her, commands three of his attendants to descend to her relief. The first represents the *Sciences* with a winged head and circle of naked boys dancing thereon; and holding *Nature* in her hand, with her numerous breasts, ready to give assistance to all. The second is *Architecture*, with a plan in one hand, and a square and pair of compasses in the other; and the third is *Liberty*, waving a hat in the air, showing her joy at the pleasing prospect of the city's speedy recovery. Behind the king stands his brother the duke of York, with a garland in one hand to crown the rising city, and a sword in the other for her defence. The two figures behind are *Justice* and *Fortitude;* the former with a coronet, and the latter with a reined lion; and under the royal pavement lies *Envy*, gnawing a heart, and incessantly emitting pestiferous fumes from her mouth. On the plinth the reconstruction of the city is represented by builders and labourers at work upon houses. On the north, south, and east sides, are inscriptions relating to the destruction occasioned by the conflagration, the regulations about rebuilding the city, and erecting the monument; and round it is the following one:—"This pillar was set up in perpetual remembrance of the most dreadful burning of this Protestant city, begun and carried on by the treachery and malice of the Popish faction, in the beginning of September, in the year of our Lord 1666, in order to their carrying on their horrid plot for extirpating the Protestant religion and *old English* liberty, and introducing Popery and slavery." Dr Wendeborn, in his account of London, observes, that the monument, though not much above 100 years old, bears visible marks of decay already; and it will not probably be long before it must be pulled down. Some

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are of opinion that this is occasioned by the fault of the architect, others by the continual shaking of the ground by coaches; but the doctor inclines to the latter opinion.

50 The Tower.

Eastward of the bridge and monument stands the *Tower*, which gives name to another ward. It is the chief fortress of the city, and supposed to have been originally built by William the Conqueror. It appears, however, to have been raised upon the remains of a more ancient fortress, erected probably by the Romans: for in 1720, in digging on the south side of what is called *Cæsar's Chapel*, there were discovered some old foundations of stone, three yards broad, and so strongly cemented that it was with the utmost difficulty they were forced up. The first work (according to Mr Pennant) seems to have been suddenly flung up in 1066 by the Conqueror, on his taking possession of the capital; and included in it a part of the ancient wall.

The great square tower, called the *White Tower*, was erected in the year 1078, when it arose under the directions of Gundulph bishop of Rochester, who was a great military architect. This building originally stood by itself. Fitz-Stephen gives it the name of *Arx Palatina*, "the Palatine Tower;" the commander of which had the title of Palatine bestowed on him. Within this tower is a very ancient chapel for the use of such of our kings and queens who wished to pay their devotion here. In 1092 a violent tempest did great injury to the Tower; but it was repaired by William Rufus and his successor. The first added another castellated building on the south side between it and the Thames, which was afterwards called *St Thomas's Tower*.

The Tower was first enclosed by William Longchamp bishop of Ely and chancellor of England, in the reign of Richard I. This haughty prelate having a quarrel with John, third brother to Richard, under pretence of guarding against his designs, surrounded the whole with walls embattled, and made on the outside a vast ditch, into which, in after times, the water from the Thames was introduced. Different princes added other works. The present contents within the walls are 12 acres and 5 rods, the circuit on the outside of the ditch 1052 feet. It was again enclosed with a mud wall, by Henry III.: this was placed at a distance from the ditch, and occasioned the taking down part of the city-wall, which was resented by the citizens; who, pulling down this precinct of mud, were punished by the king with a fine of a thousand merks.

The *Lions Tower* was built by Edward IV. It was originally called the *Bulwark*, but received the former name from its use. A menagery had very long been a piece of regal state: Henry I. had his at his manor of Woodstock, where he kept lions, leopards, lynxes, porcupines, and several other uncommon beasts. They were afterwards removed to the Tower. Edward II. commanded the sheriffs of London to pay the keepers of the king's leopards sixpence a-day for the sustenance of the leopards, and three halfpence a-day for the diet of the keeper out of the fee-farm of the city. The royal menagery is to this day exceedingly well supplied. Public Buildings.

In 1758 the Tower ditch was railed all round. New barracks were some years ago erected on the Tower wharf, which parts it from the river; and upon the wharf is a line of 61 pieces of cannon, which are fired upon state holidays. On this side of the Tower the ditch is narrow, and over it is a drawbridge. Parallel to the wharf, within the walls, is a platform 70 yards in length called the *Ladies Line*, because much frequented by the ladies in the summer; it being shaded in the inside with a row of lofty trees, and without is a delightful prospect of the shipping with boats passing and repassing on the river Thames. You ascend this line by stone steps, and being once upon it you may walk almost round the walls of the Tower without interruption.

The principal entrance into the Tower is by a gate to the west, large enough to admit coaches and heavy carriages; but these are first admitted through an outward gate, situated without the ditch upon the hill, and must pass a stout stone bridge built over the ditch before they can approach the main entrance. There is, besides, an entrance near the very south-west corner of the Tower outward wall, for persons on foot, over the drawbridge already mentioned to the wharf. There is also a water-gate commonly called *Traitor's gate*, through which it has been customary to convey traitors and other state prisoners to or from the Tower, and which is seldom opened on any other occasion; but the lords committed to the Tower in 1746 were publicly admitted at the main entrance. Over this gate is a regular building, terminated at each end by two round towers, on which are embrasures for pointing cannon. In this building there are the infirmary, the mill, and the water-works that supply the Tower with water.

In the Tower, the curiosities of which are more particularly described in the note (B), are a church, the offices of ordnance, those of the keepers of the records

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(B) In examining the curiosities of the Tower of London, it will be proper to begin with those on the outside of the principal gate. The first thing a stranger usually goes to visit is the wild beasts; which, from their situation, first present themselves: for having entered the outer gate, and passed what is called the spur-guard, the keeper's house presents itself before you, which is known by a painted lion on the wall, and another over the door which leads to their dens. By ringing a bell, and paying sixpence each person, you may easily gain admittance.

On passing the principal gate you see the White Tower, built by William the Conqueror. This is a large, square, irregular stone building, situated almost in the centre, no one side answering to another, nor any of its watch-towers, of which there are four at the top, built alike. One of these towers is now converted into an observatory. In the first story are two noble rooms, one of which is a small armoury for the sea-service, it having various sorts of arms, very curiously laid up, for above 10,000 seamen. In the other room are many closets and

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records, of the jewel office, of the Spanish armoury, the horse armoury, and the new or small armoury; with barracks for the soldiers of the garrison, and handsome houses for several officers who reside here. The principal officers of the Tower, are, a constable, a lieutenant, and a deputy-lieutenant. Belonging to this fortress are 11 hamlets; the militia of which, consisting of 400 men, are obliged, at the command of the constable of the Tower, to repair hither, and reinforce the garrison.

51 Victualling Office.

On Little Tower-hill is the *Victualling office* for the navy. It is separated from Tower-hill by a wall and gate, and contains houses for the officers, slaughter-houses, store rooms, a brew-house, a salting-house, and barrelling-house; under the direction of seven commissioners and other inferior officers.

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52 Mint.

The Mint was formerly within the Tower; but within these few years it has been removed to an elegant building, erected on purpose, on the north-east corner of Tower-hill. Its area comprises 159,700 feet, of which 71,200 are in the buildings; it cost 228,656l, exclusive of the machinery. The steam engines, &c. for coining, are of the best construction.

53 Custom-house.

In Tower ward is also the *Customhouse*, a large, handsome, and commodious building of brick and stone. It stands upon the banks of the Thames, and is accommodated

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and presses, all filled with warlike engines and instruments of death. Over this are two other floors, one principally filled with arms; the other with arms and other warlike instruments, as spades, shovels, pickaxes, and chevaux de frize. In the upper story are kept match, sheep-skins, tanned hides, &c.; and in a little room called Julius Cæsar's chapel, are deposited some records, containing perhaps the ancient usages and customs of the place. In this building are also preserved the models of the new-invented engines of destruction that have from time to time been presented to the government. Near the south-west angle of the White Tower is the Spanish armoury, in which are deposited the spoils of what was vainly called the Invincible Armada; in order to perpetuate to latest posterity the memory of that signal victory obtained by the English over the whole naval power of Spain in the reign of Philip II.

You are now come to the grand store-house, a noble building to the northward of the White Tower, that extends 245 feet in length and 60 in breadth. It was begun by King James II. who built it to the first floor; but it was finished by King William III. who erected that magnificent room called the New or Small Armoury, in which that prince, with Queen Mary his consort, dined in great form, having all the warrant workmen and labourers to attend them, dressed in white gloves and aprons, the usual badges of the order of masonry. To this noble room you are led by a folding door, adjoining to the east end of the Tower chapel, which leads to a grand staircase of 50 easy steps. On the left side of the uppermost landing-place is the work-shop, in which are constantly employed about 14 furbishers, in cleaning, repairing, and new-placing the arms. On entering the armoury, you see what they call a wilderness of arms, so artfully disposed, that at one view you behold arms for near 80,000 men, all bright and fit for service; a sight which it is impossible to behold without astonishment; and besides those exposed to view, there were, before the late war, 16 chests shut up, each chest holding about 1000 muskets. The arms were originally disposed by Mr Harris, who contrived to place them in this beautiful order, both here and in the guard-chamber of Hampton-court. He was a common gunsmith; but after he had performed this work, which is the admiration of people of all nations, he was allowed a pension from the crown for his ingenuity.

Upon the ground floor, under the small armoury, is a large room of equal dimensions with that, supported by 20 pillars, all hung round with implements of war. This room, which is 24 feet high, has a passage in the middle 16 feet wide.

The horse armoury is a plain brick building, a little to the eastward of the White Tower; and is an edifice rather convenient than elegant, where the spectator is entertained with a representation of those kings and heroes of our own nation, with whose gallant actions it is to be supposed he is well acquainted; some of them equipped and sitting on horseback, in the same bright and shining armour they were used to wear when they performed those glorious actions which gave them a distinguished place in the British annals.

You now come to the line of kings, which your conductor begins by reversing the order of chronology; so that in following them we must place the last first.

In a dark strong stone room, about 20 yards to the eastward of the grand store-house, or new armoury, the crown jewels are deposited. 1. The imperial crown, with which it is pretended that all the kings of England have been crowned since Edward the Confessor in 1040. It is of gold, enriched with diamonds, rubies, emeralds, sapphires, and pearls: the cap within is of purple velvet, lined with white taffety, turned up with three rows of ermine. They are, however, mistaken in showing this as the ancient imperial diadem of St Edward; for that, with the other most ancient regalia of this kingdom, was kept in the arched room in the cloisters in Westminster Abbey till the civil war: when, in 1642, Harry Martin, by order of the parliament, broke open the iron chest in which it was secured, took it thence, and sold it, together with the robes, sword, and sceptre, of St Edward. However, after the Restoration, King Charles II. had one made in imitation of it, which is that now shown. 2. The golden orb, or globe, put into the king's right hand before he is crowned: and borne in his left hand, with the sceptre in his right, upon his return into Westminster-hall after he is crowned. It is about six inches in diameter, edged with pearl, and enriched with precious stones. On the top is an amethyst, of a violet colour, near an inch and a half in height, set with a rich cross of gold, adorned with diamonds, pearls, and precious stones. The whole height of the ball and cup is 11 inches. 3. The golden sceptre, with its cross set upon a large amethyst of great value, garnished round with table diamonds.

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commodated with large wharfs, keys, and warehouses. On this spot is the busy concourse of all nations, who pay their tribute towards the support of Great Britain. About the year 1559, the loss to the revenue, by collecting it in different parts of the city, was first discovered, and an act passed to compel people to land their goods in such places as were appointed by the commissioners of the revenue; and this was the spot fixed on: A customhouse was erected; which, being destroyed by the great fire, was rebuilt by Charles II. In 1718 it underwent the same fate, and was restored in its present form. It was burnt a third time in 1814, and has since been rebuilt on a greater scale. The area is 480 feet long by 100 broad, and it will accommodate 1700 clerks, tidewaiters, &c. The long room is 190 feet by 67. The lower floor consists of bonding vaults. In 1268 the half years customs for foreign merchandise in the city of London, came only to 75l. 6s. 10d. In 1700, the imports of London were about 4,785,000l. Since the peace in 1815, the annual amount of the imports and exports, is estimated at 70,000,000l.; of which 5,000,000l. imports, and 8,000,000l. exports, are for the coasting trade; and 30,000,000l. imports, with 27,000,000l. exports, are for the foreign trade. In the course of the year there generally arrive about 14,000 vessels, including repeated voyages. The number of vessels belonging to London on an average of some years, amounts to about 3000, of about 600,000 tons, and navigated by 45,000 men.

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In Water-lane, a little to the north-west of the customhouse,

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The handle of the sceptre is plain, but the pummel is set round with rubies, emeralds, and small diamonds. The top rises into a *fleur-de-lis* of six leaves, all enriched with precious stones, from whence issues a mound or ball, made of the amethyst already mentioned. The cross is quite covered with precious stones. 4. The sceptre, with the dove, the emblem of peace, perched on the top of a small Jerusalem cross, finely ornamented with table diamonds and jewels of great value. This emblem was first used by Edward the Confessor, as appears by his seal; but the ancient sceptre and dove was sold with the rest of the regalia, and this now in the Tower was made after the Restoration. 5. St Edward's staff, four feet seven inches and a half in length, and three inches three quarters in circumference, all of beaten gold, which was carried before the king at his coronation. 6. The rich crown of state, worn by his majesty in parliament; in which is a large emerald seven inches round; a pearl esteemed the finest in the world; and a ruby of inestimable value. 7. The crown belonging to his royal highness the prince of Wales. The king wears his crown on his head when he sits upon the throne; but that of the prince of Wales is placed before him, to show that he is not yet come to it. 8. The late Queen Mary's crown, globe, and sceptre, with the diadem she wore at her coronation with her consort King William III. 9. An ivory sceptre, with a dove on the top, made for King James II's queen, whose garniture is gold, and the dove on the top gold enamelled with white. 10. The *curtana*, or sword of mercy, which has a blade of 32 inches long, and near two broad, is without a point, and is borne naked before the king at his coronation, between the two swords of justice, spiritual and temporal. 11. The golden spurs, and the armillas, which are bracelets for the wrists. These, though very antique, are worn at the coronation. 12. The *ampulla*, or eagle of gold, finely engraved, which holds the holy oil the kings and queens of England are anointed with; and the golden spoon that the bishop pours the oil into. These are two pieces of great antiquity. The golden eagle, including the pedestal, is about nine inches high, and the wings expand about seven inches. The whole weighs about ten ounces. The head of the eagle screws off about the middle of the neck, which is made hollow for holding the holy oil; and when the king is anointed by the bishop, the oil is poured into the spoon out of the bird's bill. 13. A rich saltseller of state, in form like the square White Tower, and so exquisitely wrought, that the workmanship of modern times is in no degree equal to it. It is of gold, and used only on the king's table at the coronation. 14. A noble silver font, double gilt, and elegantly wrought, in which the royal family are christened. 15. A large silver fountain presented to King Charles II. by the town of Plymouth, very curiously wrought; but much inferior in beauty to the above. Besides these, which are commonly shown, there are in the jewel office all the crown jewels worn by the princes and princesses at coronations, and a great variety of old curious plate.

The record office consists of three rooms, one above another, and a large round room, where the rolls are kept. These are all handsomely wainscotted, the wainscot being framed into presses round each room, within which are shelves and repositories for the records; and for the easier finding of them, the year of each reign is inscribed on the inside of these presses, and the records placed accordingly. Within these presses, which amount to 56 in number, are deposited all the rolls, from the first year of the reign of King John to the beginning of the reign of Richard III. but those after this last period are kept in the Rolls Chapel. The records in the Tower, among other things, contain the foundation of abbeys and other religious houses; the ancient tenures of all the lands in England, with a survey of the manors; the original of laws and statutes; proceedings of the courts of common law and equity; the rights of England to the dominion of the British seas; leagues and treaties with foreign princes; the achievements of England in foreign wars; the settlement of Ireland, as to law and dominion; the forms of submission of some Scottish kings for territories held in England; ancient grants of our kings to their subjects; privileges and immunities granted to cities and corporations during the period above mentioned; enrolments of charters and deeds made before the Conquest; the bounds of all the forests in England, with the several respective rights of the inhabitants to common pasture, and many other important records, all regularly disposed, and referred to in near a thousand folio indexes. This office is kept open, and attendance constantly given, from seven o'clock till one, except in the months of December, January, and February, when it is open only from eight to one, Sundays and holidays excepted. A search here is half a guinea, for which you may peruse any one subject a year.

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54 Trinity House.

customhouse, is the *Trinity House;* a society founded in 1515, at a period in which the British navy began to assume a system. The founder was Sir Thomas Spert, comptroller of the navy, and commander of the great ship Henry Grace de Dieu. It is a corporation, consisting of a master, four wardens, eight assistants, and eighteen elder brethren; selected from commanders in the navy and the merchants service; and now and then a compliment is paid to one or two of our first nobility. They may be considered as guardians of our ships, military and commercial. Their powers are very extensive: they examine the mathematical children of Christ's hospital, and the masters of his majesty's ships; they appoint pilots for the river Thames; settle the general rates of pilotage; erect light houses and sea marks; grant licenses to poor seamen, not free of the city, to row on the Thames; prevent foreigners from serving on board our ships without license; punish seamen for mutiny and desertion; hear and determine complaints of officers and men in the merchants service, but liable to appeal to the judge of the court of admiralty; superintend the deepening and cleansing of the river Thames, &c.

55 The Minories.

Between Aldgate and the Tower is the street called the *Minories*, from some poor ladies of the order of St Clare, or minoresses. They had been invited to London by Blanch, queen of Navarre, and wife to Edmund earl of Lancaster, who founded a convent for them in 1293. On the suppression of the monasteries it was converted into a dwelling house for some of the nobility, and is now in the possession of the Dartmouth family. Till of late years, the Minories were but a despicable street; but have now been excellently rebuilt, and are as elegant as any in the city.

On the west side of the city walls at this place, stood the house of the *Crutched* or *Crossed Friars*, an order instituted at Bologna in 1169, and of which a branch settled in England in 1244, where they were accommodated with a house in this place by two citizens named *Ralph Hosier* and *William Sabernas*, who became members of their order. Henry VIII. granted their house to Sir Thomas Wyat the elder, who built a handsome mansion on part of the ground where it stood. This mansion became afterwards the residence of John Lord Lumley, a celebrated warrior in the time of Henry VIII. In process of time, it was converted into a navy office: but this office being removed to Somerset-house, the India Company have erected in its place a most magnificent warehouse, in form of an oblong square of about 250 feet by 160, enclosing a court of 150 by 60 feet, the entrance to which is by an arched gateway.

56 India Company's warehouses.

57 Billingsgate.

Billingsgate ward is distinguished by its *market*. *Billingsgate* was a small port for the reception of shipping, and for a considerable time the most important place for the landing of almost every article of commerce. In the time of King William, Billingsgate began to be celebrated as a fish-market. In 1699 it was by act of parliament made a free port for fish to be sold there every day except Sunday; but Mr Pennant informs us, that the object of this has long been frustrated, and that fish are now no longer to be had there in perfection. The same author gives a list of the fish which in the time of Edward III. were brought to the London market; the monarch himself having condescended to regulate the prices, that his subjects might not be imposed upon by those who sold them. Among these were the conger-eel and porpoise, neither of which is now admitted to any table. A pike at that time cost 6s. 8d.; whence our author concludes, that it was an exotic fish, and brought over at a vast expence. Some fishes are mentioned in his list with which this naturalist owns himself unacquainted, viz. the *barkey*, *bran*, *batrile*, *cropling*, and *rumb*. In Archbishop Nevill's great feast is mentioned also a fish named *thirle-poole*, unknown at present. Seals were formerly accounted a fish; and these, together with the sturgeon and porpoise, were the only fresh fish permitted by the 33d of Henry VIII. to be bought of any stranger at sea between England, France, Flanders, and Zealand,

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58 Leadenhall.

Limestreet ward is remarkable for a very large building of great antiquity, called *Leadenhall*, with flat battlements leaded on the top, and a spacious square in the middle. In 1309 it was the house of Sir Hugh Nevill, knight; in 1384, of Humphry Bohun, earl of Hereford; in 1408 it became the property of the celebrated Whittington, who presented it to the mayor and commonalty of London; and in 1419, a public granary was erected here by Sir Simon Eyre, a citizen and draper, who built it with stone in its present form. This granary was designed as a preservative against famine, and to be kept always full of corn, which design was for some time happily answered. The house came to be used for many other purposes besides that of a granary; as for keeping the artillery and arms of the city. Preparations for any kind of pageantry or triumph were also made here; and from its strength the place was considered as the chief fortress within the city in case of any popular insurrection, and was likewise the place from whence alms were distributed. In this edifice are warehouses for the sale of leather, Colchester baize, meal, and wool. Adjoining to Leadenhall is a market, thence called *Leadenhall market*, consisting of five considerable squares or courts, and reckoned one of the greatest markets in Europe for flesh, and other provisions, as well as for leather, green hides, and wool. A little to the eastward is the *India House*, built in 1726, on the spot occupied by Sir William Craven, mayor in 1610. According to Mr Pennant, this house "is not worthy of the lords of Indostan."

59 The India-House.

60 Bank of England.

In Broad-street is the *Bank of England*, a stone building, which occupies one side of Threadneedle-street. The centre, and the building behind, were founded in the year 1733; the architect George Sampson. Before that time the business was transacted in Grocers-hall. The front is a sort of vestibule; the base rustic, the ornamental columns above Ionic. Within is a court leading to a second elegant building, which contains a hall and offices, where the debt of above 250 millions is punctually discharged. Of late years two wings of uncommon elegance, designed by Sir Robert Taylor, have been added, at the expence of a few houses, and of the church of St Christopher's le Stocks. "The name of the projector of this national glory (says Mr Pennant), was Mr James Paterson of Scotland. This palladium of our country was in

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1780 saved from the fury of an infamous banditti by the virtue of its citizens, who formed suddenly a volunteer company, and overawed the miscreants; while the chief magistrate skulked trembling in his mansion-house, and left his important charge to its fate. This important building has ever since been very properly guarded by the military; who, in passing through the city, have often given offence to many busy characters who would strive to preserve the city rights, at the expence of the national destruction. A lord mayor was the last who interested himself by applying to Mr Grenville, who gave him to understand, that if the guards were not quietly permitted to discharge their duty, the bank would be removed to Somerset-house."

61 Merchant-Taylors Hall, &c.

At the extremity of Threadneedle-street is *Merchant-Taylors Hall*. In this street also is the *South Sea House*, first established in 1711 for the purpose of an exclusive trade to the South sea, and for supplying Spanish America with negroes.

Near the junction of Throgmorton-street with Broad-street stood a magnificent house built by Cromwell earl of Essex; after whose fall, the house and gardens were bought by the Drapers company. The house was destroyed in the great fire, but rebuilt for the use of the company in a magnificent manner.

62 St Giles's.

Mr Pennant informs us, that *St Giles's church* in the fields, and a few houses to the west of it, in the year 1600, were barely separated from Broad-street. The church is supposed to have belonged to an hospital for lepers, founded about the year 1117, by Matilda queen to Henry I. In ancient times it was customary here to present to malefactors, on their way to the gallows (which, about the year 1413, was removed from Smithfield, and placed between St Giles's high-street and Hog-lane (c), a great bowl of ale, as the last refreshment they were to receive in this life. On the door to the churchyard is a curious piece of sculpture, representing the last day, containing an amazing number of figures, set up about the year 1686. This church was rebuilt in 1625. By the amazing raising of the ground by filth and various adventitious matter, the floor in the year 1730 was eight feet below the surface acquired in the intervening time. This alone made it necessary to rebuild the church in the present century. The first stone was laid in 1730; it was finished in 1734, at the expence of 10,000l.—In the churchyard is a great square pit, with many rows of coffins piled one upon the other, all exposed to sight and smell, the latter of which is highly offensive if not dangerous.

On the west side of Broad-street stood the house of the Augustines, founded by Humphry Bohun earl of Somerset in 1253, for friars and hermits of the Augustine order. On the dissolution of the monasteries, great part of the house was granted to William Lord St John, afterwards marquis of Winchester, and lord treasurer, who founded a magnificent house named *Winchester-house*. The west end of the church was granted in 1551 to John à Lasco for the use of the Germans and other fugitive Protestants, and afterwards to the Dutch as a place for preaching. A part of it was also converted into a glasshouse for Venice glass, in which the manufacture was carried on by artists from that city, and patronised by the duke of Buckingham. The place was afterwards converted into *Pinners-hall*, belonging to the company of pinmakers.

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63 Winchester House.

64 Gresham College.

To the eastward of Winchester-street stood the house of that very eminent merchant Sir Thomas Gresham, afterwards known by the name of *Gresham college*: (See GRESHAM). It has been pulled down not many years ago; and the *Excise office*, a most magnificent and at the same time simple building, rose in its place. Mr Pennant informs us, that from the 5th of January 1786 to January 5th 1787, the payments into this office amounted to no less than 5,531,114l. 6s. 10½d.

65 Excise Office.

66 Royal Exchange.

The *Royal Exchange*, which is the meeting place of the merchants of London, stands in the ward of Cornhill, and is the finest and strongest fabric of the kind in Europe. It was founded in the year 1566. Sir Thomas Gresham, merchant in London, made an offer to the lord mayor and citizens, to build, at his own expence, a commodious edifice for merchants to meet and transact business, provided the city would find him a convenient situation for the same. Mr Pennant informs us, that one Richard Clough a Welshman, originally Sir Thomas's servant, first put him on this design by a letter from Antwerp, in which he reproached the London merchants with having no place to transact their business, but walking about in the rain, more like pedlars than merchants. The citizens, in compliance with Sir Thomas's desire, purchased, for the sum of 3532l. 80 houses in the two alleys called *New St Christopher's* and *Swan-alley*, leading out of Cornhill into Threadneedle-street. The materials of those houses were sold for 478l. and the ground, when cleared, was conveyed to Sir Thomas Gresham, who, accompanied by several aldermen, laid the first brick of the new building on the 7th of June that year. Each alderman also laid his brick, and left a piece of gold for the workmen; who set about it with such assiduity and resolution, that the whole fabric was roofed by the month of November 1567, and was soon after completed under the name of the *Burse*. This building was totally destroyed by the

(c) This late place of execution, according to Mr Pennant, was called in the time of Edward III. when the gentle Mortimer finished his days here, *the Elms*: but the original as well as the present name was *Tyburne*; not from *tye* and *burn*, as if it were called so from the manner of capital punishments; but from *bourne*, the Saxon word for a "brook," and *Tyc* the name of that brook, which joined gave name to a manor before the Conquest. Here was also a village and church denominated *St John the Evangelist*, which fell to decay, and was succeeded by that of *Mary-bourne*, corrupted into *Mary la-bonne*. In 1626, Queen Henrietta Maria was compelled by her priests to take a walk by way of penance to Tyburn. What her offence was we are not told; but Charles was so disgusted at this insolence, that he soon after sent them and all her majesty's French servants out of the kingdom.

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fire in 1666; and in this place the present magnificent structure was erected at the expence of 80,000l. which stands upon a plat of ground 203 feet in length and 171 in breadth, containing an area in the middle, of 61 square perches, surrounded with a substantial and regular stone building, wrought in rustic. It has two fronts, north and south, each of which is a piazza; and in the centre are the grand entrances into the area, under a very lofty and noble arch. The south front in Cornhill is the principal; on each side of which are Corinthian demi-columns, supporting a compass pediment; and, in the intercolumniation on each side, in the front next the street, is a niche, with the statues of King Charles I. and II. in Roman habits, and well executed. Over the aperture, on the cornice between the two pediments, are the king's arms in relievo; on each side of this entrance is a range of windows placed between demi-columns and pilasters of the Composite order, above which runs a balustrade. This building is 56 feet high; and from the centre, in this front, rises a lanthorn and turret 178 feet high, on the top of which is a vane of gilt brass made in the shape of a grasshopper the crest of Sir Thomas Gresham's arms. The north front in Threadneedle-street is adorned with pilasters of the Composite order; but has neither columns nor statues on the outside; and has triangular, instead of compass, pediments. The inside of the area is also surrounded with piazzas, forming ambulatories for merchants, &c. to shelter themselves from the weather, when met there upon business. Above the arches of this piazza is an entablature with curious ornaments: and on the cornice a range of pilasters with an entablature extending round, and a compass pediment in the middle of the cornice of each of the four sides. Under the pediment on the north side are the king's arms; on the south, the city's arms; on the east, Sir Thomas Gresham's arms; and on the west, the mercers arms, with their respective enrichments. In these intercolumns are 24 niches, 20 of which are filled with the statues of the kings and queens of England. Under these piazzas, within the area, are 28 niches, all vacant but that in which Sir Thomas Gresham's statue is placed in the north-west angle, and that in the south-west, where the statue of Sir John Barnard was placed in his lifetime by his fellow-citizens, to express their sense of his merit. The centre of this area also is ornamented with a statue of King Charles II. in a Roman habit, standing upon a marble pedestal about eight feet high, and encompassed with iron rails; which pedestal is enriched on the south side with an imperial crown, a sceptre, sword, palm-branches, and other decorations, with a very flattering inscription to the king. On the west side is a Cupid cut in relievo, resting his right hand on a shield, with the arms of France and England quartered, and holding a rose in his left hand. On the north side is another Cupid supporting a shield, with the arms of Ireland; and on the east side are the arms of Scotland, with a Cupid holding a thistle; all done in relievo: the whole executed by that able statuary Mr Gibbon.

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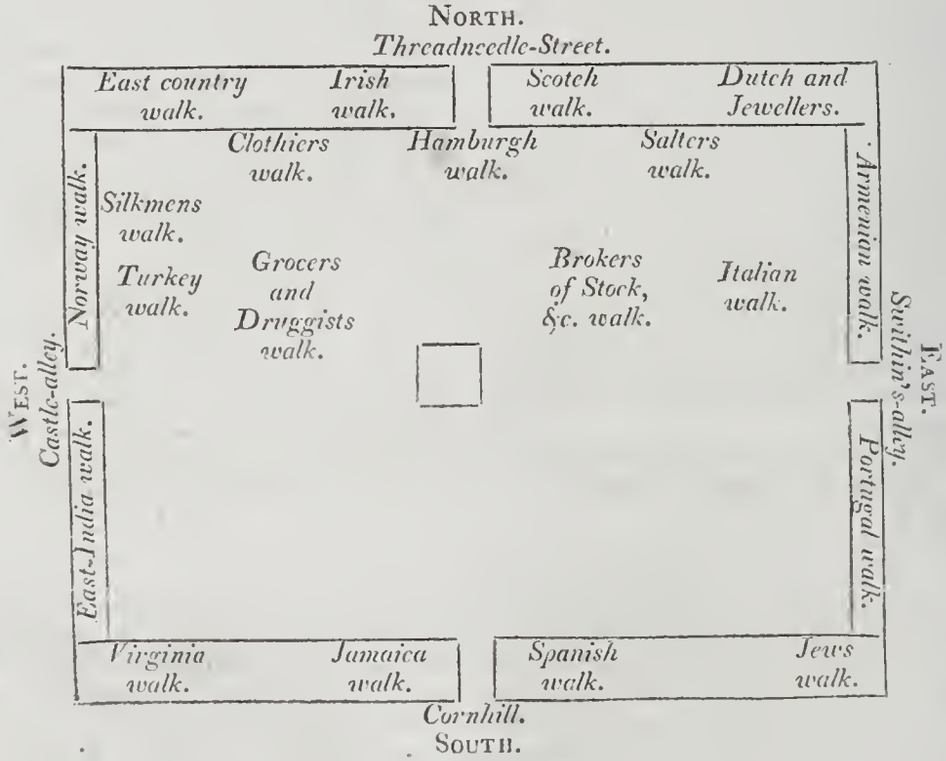
In this area, merchants, and such as have business with them, meet every day at change hours; and for the more regular and readier despatch of business, they dispose of themselves into separate walks, according to the following plan:



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In building this expensive structure there was an eye not only to magnificence, and to accommodate the merchants, but also to reimburse the expence. For this reason a gallery was built over the four sides of the Royal Exchange. This was divided into 200 shops, which were let out to haberdashers, milliners, &c. and which for several years were well occupied. But these shops have now for a long time been deserted, and the galleries are let out to the Royal Exchange Assurance-Office, the Merchant-seamen's Office, the Marine Society, and to auctioneers, &c. Under the whole area there are the finest dry vaults that can be found anywhere, which are let out to the East India Company to deposite their pepper. In the turret is a good clock with four dials, which is well regulated every day, so that it becomes a standard of time to all the mercantile part of the town; and it goes with chimes at three, six, nine, and twelve o'clock, playing upon twelve bells. The outside of this grand fabric suffers very much in its elegance from the shops that surround it, and are built within its walls; and which are occupied by booksellers, toymen, cutlers, hosiers, watchmakers, &c.

67 General Post Office.

South of the Royal Exchange, and near the west extremity of Lombard-street, is the *General Post Office*, which is a handsome and commodious building.

68 The Mansion-house.

In Walbrook ward is the *Mansion-house*, for the residence of the lord mayor. This edifice was begun in 1739, and finished in 1753. It is built of Portland stone, with a portico of six fluted columns, of the Corinthian order in the front. The basement story is very massy, and consists of rustic work; in the centre of it is the door, which leads to the kitchen, cellars, and other offices. On each side rises a flight of steps, leading up to the portico, in the middle of which is the principal entry. The stone balustrade of the stairs is continued along the front of the portico, and the columns support a large angular pediment, adorned with a group of figures in bas relief, representing the dignity and opulence of the city of London. It is an extremely heavy building, of an oblong form, and its depth is the long side, having several magnificent apartments, which are not, however, well lighted, on account of the houses that surround it.

69 St Stephen's Church.

Behind the Mansion-house is *St Stephen's Church*, in Walbrook, justly reputed the masterpiece of the celebrated Sir Christopher Wren, and said to exceed every modern structure in the world in proportion and elegance.

The Mansion-house, and many adjacent buildings, stand on the place where the *Stocks-market* once stood. This took its name from a pair of stocks erected near the spot in 1281; and was the great market of London for provisions during many centuries.

70 London-stone.

In this ward is situated one of the most remarkable pieces of antiquity in London. It is a great stone, now standing in a case on the north side of Canon-street, close under the south wall of St Swithin's church. It is called *London-stone;* and was formerly pitched edgeways on the other side of the street, opposite to where it now stands, fixed deeply in the ground, and strongly fastened with iron bars; but for the conveniency of wheel carriages it was removed to its present situation. This stone is mentioned so early as the time of Athelstan, king of the West Saxons, and has been carefully preserved from age to age. Of the original cause of its erection no memorial remains; but it is conjectured, that as London was a Roman city, this stone might be the centre, and might serve as an object from which the distance was computed to the other considerable cities or stations in the province.

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71 Merchant-Taylors School.

In Dowgate ward is a noted academy, called *Merchant-Taylors School*, from its having been founded by the merchant-taylors company, in the year 1561. It was destroyed by the fire of London in 1666, but was rebuilt, and is a very large structure, with commodious apartments for the masters and ushers, and a fine library. Sir Thomas White, lord mayor of this city, having founded St John's college in Oxford in 1557, appointed this school as a seminary for it, and established at Oxford 46 fellowships for scholars elected from this school.

72 St Mary le Bow.

The church of *St Mary le Bow*, in Cordwainers-street ward, is the most eminent parochial church in the city. It was originally built in the reign of William the Conqueror; and being the first church the steeple of which was embellished with stone arches or bows, took thence its denomination of le Bow. It was burnt down in the fire of 1666, but soon afterwards rebuilt. The steeple of this church is reckoned the most beautiful of its kind in Europe.

73 Guildhall.

In Cheap ward is *Guildhall*, or the townhouse of London. This was originally built in 1411, but so damaged by the great fire already mentioned, as to be rebuilt in 1669. The front has a Gothic appearance; and this character is also due to the two gigantic effigies which stand within the hall. The hall is 153 feet long, 50 broad, and 55 high, adorned with the royal arms, and those of the city and its companies, as well as with several portraits of English sovereigns and judges. In this building are many apartments for transacting the business of the city, besides one for each of the judicial courts, namely, that of the King's Bench, the Common Pleas, and the Exchequer.

74 Cheapside.

In the year 1246 Cheapside was an open field, named *Crown-field*, from an inn with the sign of the crown. At that time, and even for 200 years afterwards, none of the streets of London were paved excepting Thames-street, and from Ludgate-hill to Charing-Cross.

75 Goldsmiths Hall.

Goldsmith's Hall stands in Foster-lane, which opens into the west end of Cheapside,—In this lane also is

76 St Martin's le Grand

St Martin's le Grand, which, though surrounded by the city, was yet subject, near three centuries, to Westminster Abbey. A fine college was built here in 700 by Wythred, king of Kent; and, about the year 1056, rebuilt and chiefly endowed by Ingelric and Edward, two noble brothers. In 1068, it was confirmed and made independent of every other ecclesiastical jurisdiction, even that of the pope himself not excepted; and its privileges were confirmed by succeeding monarchs. It was governed by a dean, and a number of secular canons. In this jurisdiction a magnificent church was erected, but pulled down in 1548, when the college was surrendered; after which a tavern was erected on the spot.

77 The Cross and Conduit

A little to the westward of Mary le Bow church (in the adjoining ward), stood the *Cross* and *Conduit* in the middle of the street. The former was built by

Edward I. in 1290, in memory of his queen Eleanor,

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whose body was rested on that spot in its way to be buried. Originally it had the statue of the queen at full length, resembling exactly that at Northampton. Having at length fallen to decay, it was rebuilt in 1441 by John Hutherby mayor of the city, at the expence of several citizens, being now ornamented with various images, as those of the Resurrection, the Virgin Mary, &c. As the magnificent processions took this road, it was new gilt at every public entry. After the Reformation, the images gave so much offence, that it was thought proper to substitute that of Diana in place of the Virgin Mary. This, however, was resented by Queen Elizabeth, who offered a reward for the discovery of the offenders. As she imagined that a cross, the symbol of the Christian religion, could not justly give offence to any professor of that religion, she ordered a cross to be placed on the summit and gilt; but in 1643, the parliament ordered the demolition of all crosses and other marks of Romish superstition.

Splendid tournaments were held between the Cross and Sopers-lane in the year 1331; but as Queen Philippa and a great number of other ladies, dressed in rich attire, were sitting on the upper scaffolding to behold the sports, the seat gave way, and they suddenly fell down among the knights and others who stood below; many of whom were grievously hurt. The carpenters were saved from punishment by the intercession of the queen; but the king, to prevent accidents of the like nature, ordered a building of stone to be erected near Bow church, from whence the queen and other ladies might behold such spectacles in safety. This was used for the same purpose till the year 1410, when Henry IV. granted it to certain mercers, who converted it into shops, warehouses, and other places necessary for their trade.

A small distance eastward from the Cross stood the Conduit, which served to fill the lesser ones with water brought by pipes from Paddington.—This stood on the spot where the old conduit was situated, which was founded in 1285, constructed of stone lined with lead, and rebuilt in 1479 by Thomas Ilan, one of the sheriffs. On some grand occasions, these conduits have been made to run with claret; as at the coronation of Anna Bullen.

78 Mercers Hall.

On the north side of Cheapside stood the *Hospital of St Thomas of Acon*, founded by Fitz-Theobald de Helles, and his wife Agnes, sister to the famous Thomas à Becket. The hospital was built 20 years after the murder of Thomas; and such was his reputation for sanctity, that it was dedicated to him even before he was canonized, and that in conjunction with the Virgin Mary herself. The whole was granted by King Henry VIII. to the company of mercers. It was destroyed by the great fire in 1666; but rebuilt by the mercers company, who have their hall here.—Immediately to the east is a narrow street called the *Old Jewry*, which took its name from a great synagogue which stood here till the Jews were expelled the kingdom in 1291. After them an order of friars named *Fratres de sacca*, or *de penitentia*, took possession of the synagogue: and in 1305, Robert Fitzwalter, the great banner-bearer of the city, requested that the friars might assign it to him; the reason of which probably was, that it stood near to his house, which was situated in the neighbourhood of the present Grocers-hall. The chapel was bought by the grocers from Fitzwalter in 1411 for 320 marks.

79 Old Jewry.

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80 Bakewell Hall.

In Bassishaw or Basinghall ward, is *Blackwell* or *Bakewell hall*, which adjoins to Guildhall, and is the greatest mart of woollen cloth in the world. It was purchased of King Richard II. by the city; and has ever since been used as a weekly market for broad and narrow woollen cloths, brought out of the country. Formerly proclamations were issued to compel people to bring their goods into the hall, to prevent deceit in the manufactures, which might be productive of discredit in foreign markets, and likewise be the means of defrauding the poor children of Christ's hospital of part of the revenue which arose from the hallage of this great magazine. It suffered in the general devastation in 1666; but was rebuilt in 1672, and is now a spacious edifice, with a stone front adorned with columns.

81 Sion College.

Cripplegate ward is remarkable for a college, called *Sion College*, founded in 1627, on the site of Elsing-hospital (D) or priory, by Dr Thomas White, vicar of St Dunstan's in the West, for the improvement of the London clergy; and with alms-houses under their care, for 20 poor persons, 10 men and 10 women. In the year 1631, a charter was procured for incorporating the clergy of London, by which they were constituted fellows of the college; and out of the incumbents are annually elected, on Tuesday three weeks after Easter, a president, two deans, and four assistants, who are to meet quarterly to hear a Latin sermon, and afterwards be entertained at dinner in the college hall at the expence of the foundation. John Simpson, rector of St Olave's, who superintended the building, added, at his own expence, for the use of the studious part of the London clergy, a library 120 feet long, and amply filled with books.

82 Barbers Hall.

In this ward is a hall which belonged to the company of barber-surgeons, the professions of barber and surgeon being formerly exercised by the same person. It was built by the celebrated Inigo Jones, and the upper end is formed out of one of the towers or barbicans of London wall. The anatomical theatre is elliptical, and very finely contrived. The hall is now called *Barbers hall;* the surgeons, who disdained to be any longer associated with their ancient brethren, having obtained a separate charter, and built themselves a new hall in the Old Bailey.

83 St Paul's Cathedral.

Farringdon ward within, is distinguished by the most magnificent Protestant church in the world, the cathedral of *St Paul*. The best authority we have for the origin of this church, is from its great restorer Sir Christopher Wren. His opinion, that there had been a

(D) This was founded by William Elsing mercer in 1329 (on the site of a decayed nunnery), for the support of 100 blind men. He afterwards changed it into a priory, and became himself the first prior, who with four canons-regular were to superintend the miserable objects.

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a church on this spot, built by the Christians in the time of the Romans, was confirmed: when he searched for the foundations for his own design, he met with those of the original *presbyterium*, or semicircular chancel, of the old church. They consisted only of Kentish rubble stone, artfully worked, and consolidated with exceedingly hard mortar, in the Roman manner, much excelling the superstructure. He explodes the notion of there having been here a temple of Diana, and the discovery of the horns of animals used in the sacrifices to that goddess, on which the opinion had been founded, no such having been discovered in all his searches.

The first church is supposed to have been destroyed in the Diocletian persecution, and to have been rebuilt in the reign of Constantine. This was again demolished by the pagan Saxons; and restored, in 603, by Sebert, a petty prince, ruling in these parts, under Ethelbert king of Kent, the first Christian monarch of the Saxon race; who, at the instance of St Augustine, appointed Melitus the first bishop of London. Erkenwald, the son of King Offa, fourth in succession from Melitus, ornamented his cathedral very highly, and improved the revenues with his own patrimony. He was most deservedly canonized: for the very litter, in which he was carried in his last illness, continued many centuries to cure fevers by the touch; and the very chips, carried to the sick, restored them to health!

When the city of London was destroyed by fire, in 1086, this church was burnt; the bishop Mauritius began to rebuild it, and laid the foundations, which remained till its second destruction, from the same cause, in the 17th century. Notwithstanding Mauritius lived twenty years after he had begun this pious work, and Bishop Beauvages enjoyed the see twenty more, yet such was the grandeur of the design, that it remained unfinished. The first had the ruins of the Palatine tower bestowed on him, as materials for the building; and Henry I. bestowed on Beauvages part of the ditch belonging to the tower, which, with purchases made by himself, enabled him to enclose the whole with a wall. The same monarch granted besides, that every ship which brought stone for the church, should be exempted from toll; he gave him also all the great fish taken in his precincts, except the tongues: and, lastly, he secured to him and his successor the delicious tythes of all his venison in the county of Essex.

The style of the ancient cathedral was a most beautiful Gothic; over the east end was an elegant circular window; alterations were made in the ends of the two transepts, so that their form is not delivered down to us in the ancient plans; and from the central tower rose a lofty and most graceful spire. The dimensions, as taken in 1309, were these: The length six hundred and ninety feet; the breadth a hundred and twenty; the height of the roof of the west part, from the floor, one hundred and two; of the east part, a hundred and eighty-eight; of the tower, two hundred and sixty; of the spire, which was made of wood covered with lead, two hundred and seventy-four. The whole space the church occupied was three acres, three roods, and twenty-one perches.

We may be astonished at this amazing building, and naturally inquire what fund could supply money to support so vast an expence. But monarchs resigned their revenues resulting from the customs due for the materials, which were brought to the adjacent wharfs: they furnished wood from the royal forests: prelates gave up much of their revenues; and, what was more than all, by the pious bait of indulgences, and remissions of penance, brought in from the good people of this realm most amazing sums. Pope Innocent III. in 1252, gave a release of sixty days penance; the archbishop of Cologne, gave, a few years before, a relaxation of fifty days; and Boniface archbishop of Canterbury, forty days.

The high altar dazzled with gems and gold, the gifts of its numerous votaries. John king of France, when prisoner in England, first paying his respects to St Erkenwald's shrine, offered four basons of gold: and the gifts at the obsequies of princes, foreign and British, were of immense value. On the day of the conversion of the tutelar saint, the charities were prodigious, first to the souls, when an indulgence of forty days pardon was given, *vere pœnitentibus, contritis et confessis*; and, by order of Henry III. fifteen hundred tapers were placed in the church, and fifteen thousand poor people fed in the churchyard.

The holiness of this place did not prevent thieves and profligates of all denominations from lurking within the precincts, and committing, under the favour of the night, murders, and every sort of crime. Edward I. gave the dean and canons permission to enclose the whole within a wall; and to have gates, to be shut every night, to exclude all disorderly people. Within these walls, on the north-west side, was the bishop's palace. Froissart tells us, that after the great tournament in Smithfield, King Edward III. and his queen lodged here, on occasion of their nuptials (E.)—In 1561, the noble spire was totally burnt by lightning, and never restored.

In consequence of the resolutions taken in 1622, by James I.

(E) Before this cathedral was the famous *Paul's Cross*, a pulpit formed of wood, mounted upon steps of stone, and covered with lead, in which the most eminent divines were appointed to preach every Sunday in the forenoon. To this place, the court, the mayor and aldermen, and principal citizens, used to resort. The greatest part of the congregation sat in the open air; the king and his train had covered galleries; and the better sort of people were also protected from the injury of the weather but the far greater part stood exposed in the open air: for which reason the preacher went in very bad weather; to a place called the Shrouds; a covered space on the side of the church, to protect the congregation in inclement seasons. Considerable contributions were raised among the nobility and citizens, to support such preachers as were (as was often the case) called to town from either of the universities. In particular, the lord mayor and aldermen ordered that every preacher, who came from a distance, should be freely accommodated, during five days, with sweet and convenient lodgings, fire, candle,

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James I. to repair the cathedral, the celebrated Inigo Jones was appointed to the work. But it was not attempted till the year 1633, when Laud laid the first stone, and Inigo the fourth. That great architect begun with a most notorious impropriety, giving to the west end a portico of the Corinthian order, beautiful indeed, to this ancient Gothic pile; and to the ends of the two transepts Gothic fronts in a most horrible style. The great fire made way for the restoring of this magnificent pile in its present noble form by Sir Christopher Wren, an architect worthy of so great a design.

It is built of fine Portland stone, in form of a cross. On the outside are two ranges of pilasters, consisting of a hundred and twenty each; the lower range of the Corinthian order, and the upper of the Composite. The spaces between the arches of the windows and the architrave of the lower order, are filled with a great variety of curious enrichments, as are also those above. On the north side is a portico, the ascent to which is by twelve steps of black marble, and its dome supported by six very large columns. Over the dome is a pediment, the face of which is engraved with the royal arms, regalia, and other ornaments. On the south is a portico, the ascent to which is by twenty-five steps, and its dome supported by six columns, corresponding with those on the north side. The west front is graced with a most magnificent portico, supported by twelve lofty Corinthian columns: over these are eight columns of the Composite order, which support a noble pediment, crowned with its acroteria; and in this pediment is the history of St Paul's conversion, boldly carved in bas relief. The ascent to this portico is by a flight of steps of black marble, extending the whole length of the portico; and over each corner of the west front is a beautiful turret. A vast dome, or cupola, rises in the centre of the building. Twenty feet above the roof of the church is a circular range of thirty-two columns with niches, placed exactly against others within. These are terminated by their entablature, which supports a handsome gallery, adorned with a stone balustrade. Above the columns last mentioned is a range of pilasters, with windows between them: and from the entablature of these, the diameter of the dome gradually decreases. On the summit of the dome is an elegant balcony, from the centre of which runs a beautiful lanthorn, adorned with Corinthian columns. The whole is crowned with a copper ball, supporting a cross, both finely gilt. Within, the cupola stands on eight stupendous pillars curiously adorned: the roof of the choir is supported by six pillars, and that of the church by two ranges, consisting of twenty more. The roof of the church and choir is adorned with arches and spacious peripheries of enrichments, admirably carved in stone. Quite round the inside of the cupola, there is a whispering iron balcony, or gallery, the top of which is richly painted by Sir James Thornhill.

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The first stone of this superb edifice was laid on June 21. 1675; and the building was completed in 1710; but the whole decorations were not finished till 1723. It was a most singular circumstance, that, notwithstanding it was 35 years in building, it was begun and finished by one architect, and under one prelate, Henry Compton bishop of London. The church of St Peter's was 135 years in building, in the reigns of 19 popes, and went through the hands of twelve architects. It is not, as often mistaken, built after the model of that famous temple: it is the entire conception of our great countryman, and has been preferred in some respects by a judicious writer, to even the Roman Basilica. Its dimensions are less. The comparative view is given in the Parentalia, and copied in London and its Environs. The height of St Peter's, to the top of the cross, is 437 feet and a half; that of St Paul's 340 feet; so that, from its situation, it is lofty enough to be seen from the sea. The length of the first is 729 feet; of the latter, 500. The greatest breadth of St Peter's is 364; of St Paul's, 180.

In the reigns of James I. and Charles I. the body of this cathedral was the common resort of the politicians, the news mongers, and idle in general. It was called *Paul's walk;* and is mentioned in the old plays and other books of the times.

Notwithstanding the magnificence of this noble pile, however, it is remarked to have many defects. Its situation is such, that it cannot be viewed at a distance. The division of the porticos, and the whole structure, into two stories on the outside, certainly indicates a like division within, which is acknowledged to be a fault. The dome, it has also been observed, bears too great a proportion to the rest of the pile, and ought to have been raised exactly in the centre of the building; besides that, there ought to have been two steeples at the east end, to correspond with those at the west. On entering this church, we instantly perceive an obvious deficiency, not only of elevation but length, to assist the perspective; and the columns are heavy and clumsy, rather encumbering the prospect than enriching it.

St Paul's occupies an area of six acres, and is railed all round with iron balustrades, each about five feet and a half high, fixed on a dwarf wall of hewn stone. In the west end of this area is a marble statue of Queen Anne, holding a sceptre in one hand, and a globe

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candle, and all necessaries. And notice was given by the bishop of London, to the preacher appointed by him, of the place he was to repair to.

We hear of this being in use as early as the year 1259. It was used, as Mr Pennant observes, not only for the instruction of mankind by the doctrine of the preacher, but for every purpose political or ecclesiastical; for giving force to oaths, for promulging of laws, or rather the royal pleasure, for the emission of papal bulls, for anathematizing sinners, for benedictions, for exposing of penitents under censure of the church, for recantations, for the private ends of the ambitious, and for the defaming of those who had incurred the displeasure of crowned heads.

It was demolished in 1643 by order of parliament, executed by the willing hands of Isaac Pennington the fanatical lord mayor of that year, who died in the Tower a convicted regicide.

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globe in the other, surrounded with four emblematical figures representing Great Britain, France, Ireland, and America.

Besides very large contributions for carrying on this edifice, the parliament granted a duty on sea-coal, which, at a medium, produced 5000l. a-year; and the whole expence of the building is said to have amounted to 736,752l. 2s. 3d.

On the east side of the cathedral is *St Paul's School*, founded in 1509 by Dr John Collet dean of this church, who endowed it for a principal master, an under-master, a chaplain, and 153 scholars.

84 College of Physicians.

In Warwick-lane, in the same ward, stands the *College of Physicians*, erected in 1682 by Sir Christopher Wren. It is built of brick, and has a spacious stone frontispiece. Near the south extremity of the Old Bailey, on the east side, is the hall of the Company of Surgeons, with a theatre for dissection.

85 Christ's Hospital.

Adjoining to Christ-church in Newgate-street is *Christ's Hospital*, which, before the dissolution of monasteries by Henry VIII. was a house of Gray-friars. The hospital was founded by King Edward VI. for supporting and educating the fatherless children of poor freemen of this city; of whom 1000 of both sexes are generally maintained in the house or out at nurse, and are likewise clothed and educated. In 1673, a mathematical school was founded here by Charles II. endowed with 320l. a-year; and a writing school was added in 1694 by Sir John Moor, an alderman of the city. After the boys have been seven or eight years on the foundation, some are sent to the university and others to sea; while the rest, at a proper age, are put apprentices to trades at the charge of the hospital. At first their habit was a russet cotton, but was soon after changed for blue, which has ever since continued to be their colour; and on this account the foundation is frequently called the *Blue-coat hospital*. The affairs of this charity are managed by a president and about 300 governors, besides the lord mayor and aldermen. The fabric, which is partly Gothic and partly modern, was much damaged by the fire of 1666, but was soon repaired, and has been since increased with several additions. The principal buildings, which form the four sides of an area, have a piazza round them with Gothic arches, and the walls are supported by abutments. The front is more modern, and has Doric pilasters supported on pedestals.

86 Doctors Commons.

In Castle-Baynard ward is a large structure called *Doctors Commons*. It consists of several handsome paved courts, in which the judges of the court of admiralty, those of the court of delegates, of the court of arches, and the prerogative court, with the doctors that plead causes, and the proctors of the place, all live in a collegiate way; and from commoning together, as in other colleges, the name of Doctors Commons is derived. Here courts are kept for the trial of civil and ecclesiastical causes under the archbishop of Canterbury and the bishop of London. The college has an excellent library, every bishop at his consecration giving 25l. or 50l. towards purchasing books for it.

87 College of Heralds.

Near Doctors Commons, on St Bennet's Hill, is the *College of Heralds*, who were incorporated by King Richard III. Besides the chief officer, who is the earl-marshal of England, here are three kings at arms, viz. Garter, Clarencieux, and Norroy, with six heralds, four pursuivants, and eight proctors. Garter attends the instalments of knights of that order, carries the garter to foreign princes, regulates the ceremonies at coronations, and the funerals of the royal family and nobility: Clarencieux directs the funeral ceremonies of those under the degree of peers south of Trent; and Norroy performs the like office for those north of Trent. This building was originally the house of the earl of Derby. It is a spacious quadrangle, built of brick, and has convenient apartments. Here are kept records of the coats of arms of all the families and names in England, with an account when they were granted, and on what occasions.

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88 Bridewell.

In Farringdon ward without, is a large building called *Bridewell*, from a spring formerly known by the name of St Bridget's or St Bride's Well. It was originally a royal palace, and occupied all the ground from Fleet-ditch on the east to Water-lane on the west. That part of it now called *Salisbury-court* was given to the bishops of Salisbury for their town residence; and the east part, which was rebuilt by King Henry VIII. is the present Bridewell. It was granted to the city by Edward VI. as an hospital; and he endowed it for the lodging of poor travellers, and for the correction of vagabonds, strumpets, and idle persons, as well as for finding them work. In one part of the building 20 artificers have houses; and about 150 boys, distinguished by white hats and blue doublets, are put apprentices to glovers, flaxdressers, weavers, &c. and when they have served their time are entitled to the freedom of the city, with 10l. towards carrying on their respective trades. The other part of Bridewell is a receptacle for disorderly persons, who are kept at beating hemp and other hard labour.

Near Bridewell is *St Bride's Church*, a stately fabric 111 feet long, 57 broad, and 41 high, with a beautiful spire 234 feet in altitude, and has a ring of 12 bells in its tower.

89 Blackfriars Bridge.

Opposite to Fleet-ditch, over this part of the river, stands *Blackfriars Bridge*; a most elegant structure, built after the design of Mr Robert Mylne. The situation of the ground on the two shores obliged the architect to employ elliptical arches; which, however, have a very fine effect. The number of arches is nine; of which the centre one is 100 feet wide. The whole length is 995 feet; the breadth of the carriage way is 28 feet, and that of the two foot-ways 7 each. Over each pier is a recess; an apology for the beautiful Ionic pillars which support them, and which have a most beautiful effect from the river. This bridge was begun in 1760; and finished in 1768, at the expence of 152,840l. to be discharged by a toll upon the passengers. It is situated almost at an equal distance between those of Westminster and London, commands a view of the Thames from the latter to Whitehall, and discovers the majesty of St Paul's in a very striking manner.

90 Smithfield.

West Smithfield. In this ward is an area containing three acres of ground, called in old records *Smithfield-Pond* or *Horse-Pool*, it having been formerly a watering place for horses. It was in ancient times the common place of execution; and at the south-west corner there was a gallows called the *Elms*, from a number of elm-tree-

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trees that grew in the neighbourhood. It was likewise the scene of public justs and tournaments, and has been a market-place for cattle above 500 years.

91 St Bartholomew's Hospital.

On the south side of this area, and contiguous to Christ's hospital, is *St Bartholomew's Hospital*. It was originally founded soon after the accession of Henry I. by Rahere the king's jester, as an infirmary for the priory of St Bartholomew the Great, which then stood near the spot. But upon the dissolution of religious houses, Henry VIII. refounded it, and endowed it with 500 marks a-year, on condition that the citizens should pay the same sum annually for the relief of 100 lame and infirm patients. The endowments of this charity have since been so much enlarged, that it now receives the distressed of all denominations. In 1702, a beautiful frontispiece was erected towards Smithfield, adorned with pilasters, entablature, and a pediment of the Ionic order, with a statue of King Henry VIII. standing in a niche in full proportion, and those of two cripples on the top of the pediment over it. In 1729, a plan was formed for rebuilding the rest of this hospital, in consequence of which a magnificent edifice has been erected.

Among many other privileges granted by Henry I. to the prior and canons of the monastery of St Bartholomew the Great, and to the poor of the infirmary, was that of keeping a fair in Smithfield on the eve, day, and morrow, of St Bartholomew. This fair, called *Bartholomew fair*, has been held annually ever since: and by the indulgence of the magistrates of London, to whom the privilege of keeping it devolved upon the dissolution of the priory, it used to continue a fortnight. A great number of booths was erected in it by the actors of the theatres, for the exhibition of dramatic performances of various kinds; and it became at length a scene of so much licentiousness and riot, that Sir John Barnard when lord mayor of London reduced the time of the fair to its original duration of three days. This laudable example has been followed ever since; and the magistrates have likewise prohibited all public exhibitions which had been formerly accompanied with so much disorder.

92 Old Bailey.

In a street in this ward, called the *Old Bailey*, is a hall named *Justice hall*, or the *Session's house*, where a court is held eight times a-year by the king's commission of oyer and terminer for the trial of criminals for offences committed within the city of London and county of Middlesex. The judges of this court are the lord mayor, those of the aldermen that have served that office, and the recorder; who are attended by the sheriffs and by one or more of the national judges.

93 Newgate.

In this street is also the great criminal prison, rebuilt in 1777 in a more convenient situation, and on a more enlarged plan, than the former prison, called *Newgate*: by which name it is still distinguished. It consists of two wings, the debtors and the felons side, with the keeper's house in the middle. The felons are generally between 200 and 300. Single rooms in the state-side of the prison, or in the governor's house, are let to prisoners who chuse to pay for them.

94 Fleet-prison.

In this ward is likewise a prison called the *Fleet Prison*, from a small river named the Fleet which formerly ran by it: the building is large. It is a prison for the confinement of debtors, and such as are committed for contempt of court. There are 109 rooms, $14\frac{1}{2}$ feet by $12\frac{1}{2}$. The number of prisoners is generally between 200 and 300. They are allowed to exercise and amuse themselves in a large court.

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95 The Rolls.

In Chancery-lane is an office consisting of a house and chapel, called the office and chapel of the *Rolls*, from being the great repository of the modern rolls and records of the kingdom. This building was originally the house of an eminent Jew; but being forfeited to the crown, King Henry III. in the year 1223, converted it into a hospital for the reception and accommodation of Jewish and other proselytes. In 1377, Edward III. granted this hospital and its chapel to William Burstall, master of the rolls, to whose successors in that office it has ever since belonged. Round this office there is a small district consisting of about 200 houses, called the *Liberty of the Rolls*, over which the magistrates of London have no authority, it being under the government of the master of the rolls.

In this ward are several *Inns* of court and chancery, particularly the Inner and Middle Temple, Serjeants Inn, Clifford's Inn, Barnard's Inn, Staple's Inn, and Furnival's Inn.

96 The Temple.

The *Temple* received its name from being originally founded by the Knights Templars, who settled here in 1185. It was at first called the *New Temple*, to distinguish it from the former house of the Knights Templars, which stood in Holborn near Chancery lane. The original building was divided into three parts; the Inner, the Middle, and the Outer Temple. The Inner and the Outer Temple were so called, because one was within and the other was without the Bar; and the Middle derived its name from being situated between them. Upon the dissolution of the order of Knights Templars, the New Temple devolved to the Knights Hospitallers of St John of Jerusalem, who granted a lease of it to the students of the common law, and converted that part of it called Inner and Middle Temple into two inns of court for the study and practice of the common law. The Outer Temple became a house for the earl of Essex.

The buildings of the Temple escaped the fire in 1666, but were most of them destroyed by subsequent fires, and have since been rebuilt. The two Temples are each divided into several courts, and have pleasant gardens on the banks of the Thames. They are appropriated to distinct societies, and have separate halls, where the members dine in common during term-time. The Inner Temple hall is said to have been built in the reign of Edward III. and the Middle Temple hall, which is a magnificent edifice, was rebuilt in 1572 in form of a college hall. The Middle Temple gate, Mr Pennant informs us, was erected by Sir Amias Powlet on a singular occasion. It seems that Sir Amias, about the year 1501 thought fit to put Cardinal Wolsey, then parson of Lymington, into the stocks. In 1515, being sent for to London by the cardinal on account of that ancient grudge, he was commanded not to quit town till farther orders. In consequence, he lodged five or six years in this gateway, which he rebuilt; and to pacify his eminence, adorned the front with the cardinal's cap, badges, cognisance, and other devices of this butcher's son; so low were the great

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men obliged to stoop to that meteor of the times! Each temple has a good library, adorned with paintings, and well furnished with books. An assembly, called a *parliament*, in which the affairs of the society of the Inner Temple are managed, is held there every term. Both Temples have one church, first founded in 1185, by the Knights Templars; but the present edifice is supposed to have been built in 1420. It is supported by neat slender pillars of Sussex marble, and is one of the most beautiful Gothic structures in England. In this church are many monuments, particularly of nine Knight Templars cut in marble in full proportion, some of them seven feet and a half long; six are cross-legged, and therefore supposed to have been engaged in the crusades. The minister of this church, who is usually called the *master of the Temple*, is appointed by the benchers or senior members of both societies, and presented by a patent from the crown. Shakespeare (whether from tradition or history) makes the Temple garden the place in which the badge of the white and red rose originated; the distinctive badge of the houses of York and Lancaster, under which the respective partizans of each arranged themselves in the fatal quarrel which caused such torrents of English blood to flow.

Near the Temple bar is the *Devil's Tavern*, so called from its sign of St Dunstan seizing the evil spirit by the nose with a pair of hot tongs. Ben Johnson has immortalized it by his *Leges Conviviales*, which he wrote for the regulation of a club of wits held in a room he dedicated to Apollo; over the chimney-piece of which they are preserved. The tavern was in his days kept by Simon Wadloe; whom, in a copy of verses over the door of the Apollo, he dignified with the title of *King of Skinkers*.

97 Inns of Chancery.

Serjeants Inn is a small inn in Chancery-lane, where the judges and serjeants have chambers, but not houses, as they had in another inn of this name in Fleet-street, which they abandoned in 1730; but in each of them there is a hall and a chapel. *Clifford's Inn* is an inn of chancery belonging to the Inner Temple. It was originally a house granted by Edward II. to the family of the Cliffords, from which it derived its name; but was afterwards let upon lease to the students of the law, and in the reign of Edward III. sold to the members of this society. *Bernard's Inn* is likewise an inn of chancery belonging to Gray's Inn. It stands in Holborn, and was the house of John Mackworth, dean of Lincoln, who gave it to the professors of the law. *Staple's Inn* belongs also to Gray's Inn, and is situated in Holborn. It was once a hall for the merchants of the staple for wool, whence it derives its name; but it was purchased by the benchers of Gray's Inn, and has been an inn of chancery since the year 1415. *Furnival's Inn*, is an inn of chancery belonging to Lincoln's Inn, and was once the house of the family of the Furnivals, by whom it was let out to the professors of the law. It is a large old building, with a hall and a pleasant garden.

98 Bethlehem Hospital.

In Coleman-street ward, on the south side of a large square called *Moorfields*, stood *Bethlehem Hospital*, founded in 1675 by the lord mayor and citizens of London for the reception and cure of poor lunatics. It was a noble edifice, built with brick and stone, and adorned with pilasters, entablatures, and sculpture; particularly with the figures of two lunatics over the grand gate, which are well executed. This building was 540 feet long and 40 broad, exclusive of two wings of a later erection, intended for the reception of such lunatics as were deemed incurable. This hospital contained a great number of convenient cells or apartments, where the patients were maintained and received all medical assistance without any other expence to their friends than that of bedding. The structure was divided into two stories, through each of which ran a long gallery from one end of the house to the other. On the south side were the cells, and on the north the windows that gave light to the galleries, which were divided in the middle by handsome iron gates, to keep the men and women separate. This hospital being pulled down, it is intended to erect another building for the use of the same charity, at a short distance from the metropolis. A new road is to be opened from the site of the old hospital to the Royal Exchange.

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99 St Luke's Hospital.

Opposite to Bethlehem hospital stood that of *St Luke*, a long plain building, till of late appropriated to the same purposes, but wholly independent of the former. It was founded on the humane consideration that Bethlehem was incapable of receiving all the miserable objects which were offered. Of late years the patients were removed from the old hospital to a new one erected under the same name in Old-street, on the plan of the former, extending in front 492 feet. The old hospital is now pulled down, and replaced by a handsome row of houses. Uncured patients may be taken in again, by a very liberal regulation, on the payment of five shillings a week; so that their friends may, if they choose, try a second time the force of medicine on their unhappy relations or acquaintances.

100 Different markets.

Besides the three markets already mentioned at Smithfield for cattle and hay, at Leadenhall for butchers meat, wool, hides, and Colchester baize, and at Billingsgate for fish; there are in this city the following other markets, which are all very considerable, viz. Honey lane, Newgate, and Fleet-market, chiefly for flesh, though with separate divisions for fish, butter, eggs, poultry, herbs, and fruit; and the Three-Cranes market, for apples and other fruit. The principal corn-market is held in a neat exchange situated in Market-lane, and that for flour at Queenhithe. In Thames-street, near Billingsgate, there is an exchange for dealers in coals and masters of vessels in that trade to transact their business.

101 2. Borough of Southwark, its jurisdiction, &c.

II. *The borough of* SOUTHWARK. It was called by the Saxons *Suth*, or the "South work," in respect to some fort or fortification bearing that aspect from London. It was also called the Borough, or *Burg*, probably from the same reason. It was long independent of the city of London: but, in consideration of the inconveniences arising from the escape of malefactors from the great capital into this place, it was in 1327 granted by Edward III. to the city, on payment of 10l. annually. It was then called the *village* of Southwark; it was afterwards styled the *bailiwick* of Southwark, and the mayor and commonalty of London appointed the bailiff. This power, however, not being sufficient to remedy the evil, a more intimate connexion was thought necessary; and in the reign of Edward VI. on a valuable consideration paid to the crown, it was formed into a 26th ward, by the title of *Bridge Ward Without*; with a reservation of certain

Public Buildings, &c.

privileges enjoyed there by the archbishop of Canterbury and some other ecclesiastics. In consequence of this, it was subjected to the lord mayor of London, with the steward and bailiff. But Southwark being divided into two parts, this is to be understood of the division called the *Borough Liberty*, which consists of three of the parishes belonging to the town, with the greater part of a fourth parish. For the city division, the lord mayor by his steward holds a court of record every Monday at the sessions house on St Margaret's Hill in this borough, for all debts, damages, and trespasses within the limits of his jurisdiction. The other division is called the *Clink*, or the *Manor of Southwark*, and is subdivided into the Great Liberty, the Guildhall, and the King's Manor; for each of which subdivisions a court-leet is held, where the constables, ale-conners, and flesh-tasters, are chosen, and other business of this kind transacted. A court-house, called *Union Hall*, has lately been built in the new street called *Union-street*, which leads in a direct line from the high-street in the Borough to Great Surry-street Blackfriars road. The Clink liberty is under the jurisdiction of the bishop of Winchester, who, besides a court-leet, keeps here a court of record on the Bankside near St Saviour's church, by his steward or bailiff, for pleas of debts, damages, and trespasses. Court-leets are also kept at Lambeth, Bermondsey, and Rotherhithe, three small districts adjoining to the Borough. There is a compter for the imprisonment of offenders in the bailiwick, and another for the Clink liberty; to which may be added the Surry workhouse for vagrants. Besides these, there is the Marshalsea prison, which is the county gaol for felons, and the admiralty gaol for pirates (G); in which is a court, first erected for trials of causes between the king's domestics or menial servants, of which the knight-marshal is president, and his steward judge, to whom belong four counsellors and six attorneys; and the court is held every Friday, by him, or his deputy, for debt, damages, and trespasses, in causes for 10 miles round Whitehall, excepting London. In this quarter is also the King's Bench prison, the rules of which are above two miles in circuit, and comprise the greatest part of St George's Fields. Here was committed Henry prince of Wales, afterwards King Henry V. by the spirited and honest Judge Gascoigne, for striking or insulting him on the bench. It is a very extensive and commodious building. There are 224 rooms about 14 or 16 feet by 12 or 13: eight of these are state-rooms that are let unfurnished at 2s. 6d. a-week. Within the walls of this prison are several shops, and the whole has the appearance of a small village. It is surrounded by walls 30 feet high. The rules or liberties of this prison are very extensive, comprehending a circuit of nearly three miles round it.

102 Courts.

103 Prisons.

104 King's Bench.

105 Parishes, &c.

Southwark consists of the parishes of St Olave, St Saviour, St George, and St Thomas; the parish of Christ-church, though contiguous to the Borough, is in the county of Surry.

Public Buildings, &c.

The principal church in Southwark is that of *St Saviour*, which was formerly a priory of regular canons. Being dedicated to the Virgin Mary, and situated near the bank of the Thamas, it was called *St Mary Over Ree*, or *Overy*, by which appellation it is commonly known. This church is built in the manner of a cathedral, with three aisles from east to west, and a cross aisle. It is reckoned the largest parish-church in England, the three aisles first mentioned measuring 269 feet in length, and the cross aisle 109 feet. The height within is 47 feet, and it has a tower with four spires 150 feet high.

Not far from St George's church stood the magnificent palace of Charles Brandon duke of Suffolk, the deserved favourite of Henry VIII. After his death, in 1545, it came into the king's hands, who established here a royal mint. It at that time was called *Southwark Place*, and in a great measure preserved its dignity. Edward VI. once dined in it. His sister and successor presented it to Heath, archbishop of York, as an inn or residence for him and his successors whenever they repaired to London. As to the Mint, it became a sanctuary for insolvent debtors; but at length becoming the pest of the neighbourhood, by giving shelter to villains of every species, that awakened the attention of parliament; which by the statutes 8 and 9 Will. III. 9 George I. and 11 George I. entirely took away its abusive privileges.

106 Ancient places of diversion.

In the parish of Christ-church, near the water on Bankside, stood *Paris-garden*, one of the ancient play-houses of our metropolis. Ben Johnson is reproached by one Decker, an envious critic, with his ill success on the stage, and in particular with having performed the part of Zuliman at Paris-garden. It seems to have been much frequented on Sundays. This profanation (Mr Pennant observes) was at length fully punished by the dire accident which befel the spectators in 1582, when the scaffolding suddenly fell, and multitudes of people were killed or miserably maimed. The omen seems to have been accepted; for in the next century the manor of Paris-garden was erected into a parish, and a church founded under the name of Christ's.

Beyond this place of amusement were the Bear-garden and place for baiting of bulls, the *British circi*; "Herein (says Stow) were kept beares, bulls, and other beasts to be bayted; as also mastives in several kennels nourished to bayt them. These beares and other beasts are there kept in plots of ground scaffolded about for the beholders to stand safe." This was then an amusement for persons of the first rank: our great, if not good, Elizabeth caused the French ambassadors to be carried to this theatre, to divert them with these bloody spectacles.

107 The Stews.

Not far from these scenes of cruel pastime was the *Bordello*

(G) In 1377 this prison was broken open by a mob of sailors, who murdered a gentleman confined in it for killing one of their comrades, and who had been pardoned by the court. It was again broken open by Wat Tyler and his followers in 1381. It escaped in the infamous riots of 1780, while the King's Bench, the Borough Prison, and the Clink Prison, were nearly at the same instant sacrificed to their fury.

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Bordello or *Stews*, permitted and openly licensed by government, under certain laws or regulations. They were farmed out. Even a lord mayor did not disdain to own them: but rented them to the *Froes*, that is, "the bawds," of Flanders. Among other singular regulations, no stewholder was to admit married women; nor were they to keep open their houses on Sundays; nor were they to admit any women who had on them the perilous infirmity of burning. These infamous houses were very properly suppressed in the reign of Henry VIII.

The bishop of Winchester had formerly a palace here with a park (the same that is now called *Southwark-park*), which is since converted into warehouses and tenements, held by lease from the bishops of that see.

108 St Thomas's Hospital.

Besides several alms-houses, there are here *St Thomas's* and *Guy's Hospital*, two of the noblest endowments in England. The former was first erected in 1215 by Peter de Rupibus, bishop of Winchester, who endowed it with land to the amount of 343l. a-year; from which time it was held of the abbots of Bermondsey, one of whom in 1428 granted a right to the master of the hospital to hold all the lands it was then in possession of belonging to the said abbot and convent, the whole revenue of which did not exceed 266l. 17s. 6d. per annum. In the year 1551, after the citizens of London had purchased of Edward VI. the manor of Southwark and its appurtenances, of which this hospital was a part, they expended 1100l. in repairing and enlarging the edifice, and immediately received into it 260 patients; upon which the king in 1553 incorporated this hospital with those of Christ-church and Bridewell in the city of London. The building being much decayed, three beautiful squares adorned with colonnades were erected by voluntary subscription in 1693, to which in 1732 the governors added a magnificent building, consisting of several wards with proper offices. The annual disbursements of this hospital have for many years amounted to 8000l. The house is divided into 19 wards, and is said to contain 474 beds.

109 Guy's Hospital.

Adjoining to St Thomas's stands *Guy's Hospital*, perhaps the most extensive charitable foundation that ever was established by one man in private life. The founder of this hospital was Thomas Guy, a bookseller in Lombard-street, London, who lived to see the edifice roofed in; and at his death, in 1724, left 238,292l. 16s. including the expence of the building, to finish and endow it. This hospital consists of two capacious squares, containing 12 wards and 435 beds. It was incorporated by charter from parliament, and the first governors were appointed in 1725.

In St George's Fields, westward of the King's Bench prison, is the *Magdalen Hospital* for the reception of penitent prostitutes; a little farther is situated the Asylum for orphan girls; and not far distant is the Westminster Lying-in Hospital: Institutions, of which the following feeling and animated account is given by Mr Pennant.

110 The Asylum.

"The *Asylum* is an institution of a most heavenly nature, calculated to save from perdition of soul and body the brighter part of the creation; such on whom Providence hath bestowed angelic faces and elegant forms, designed as blessings to mankind, but too often debased to the vilest uses. The hazard that these innocents constantly are liable to from a thousand temptations, from poverty, from death of parents, from the diabolical procuress, and often from the stupendous wickedness of parents themselves, who have been known to sell their beauteous girls for the purpose of prostitution, induced a worthy band to found in the year 1758 the Asylum, or House of Refuge. Long may it flourish, and eternal be the reward of those into whose minds so amiable a conception entered!

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111 The Magdalen Hospital.

"To afford means of salvation to those unhappy beings who had the ill fortune to lose the benefits of this divine institution, the *Magdalen Hospital* was instituted for the reception of the penitent prostitutes. To save from vice, is one great merit. To reclaim and restore to the dignity of honest rank in life, is certainly not less meritorious. The joy at the return of one sinner to repentance is esteemed by the highest authority worthy of the heavenly host. That ecstasy, I trust, this institution has often occasioned. Since its foundation in the same year with the former, to December 25. 1786, not fewer than 2471 have been admitted. Of these (it is not to be wondered that long and evil habits are often incurable) 300 have been discharged, uneasy under constraint; 45 proved lunatics, and afflicted with incurable fits; 60 have died; 52 never returned from hospitals they were sent to; 338 discharged for faults and irregularities. How to be dreaded is the entrance into the bounds of vice, since the retreat from its paths is so difficult! Finally, 1608 prodigals have been returned to their rejoicing parents; or placed in reputable services, or to honest trades, banes to idleness, and securities against a future relapse." Into this charity, every woman who has been seduced (and is not pregnant or diseased), whether recommended or not, may apply for admission to the committee, who meet for that purpose on the first Tuesday in every month.

112 Lying in Hospital.

Akin to those charities is that of the *Lying-in-Hospital*, which is not intended merely for the reception of "the honest matron who can deposite her burden with the consciousness of lawful love, but also for the unhappy wretches whom some villain in the unguarded moment has seduced, and then left a prey to desertion of friends, to poverty, want, and guilt.—Lest such 'may be driven to despair by such complicated misery, and be tempted to destroy themselves and murder their infants,' here was founded in 1765 this humane preventive, the Westminster New Lying-in Hospital, in which every assistance and accommodation requisite in such situations are provided in the most attentive and liberal manner. To obviate all objection to its being an encouragement to vice, no one is taken in a second time: but this most excellent charity is open to the worthy distressed matron as often as necessity requires. None are rejected who have friends to recommend. And of both descriptions upwards of 4000 have experienced its salutary effect."

113 St George's Fields.

St George's Fields are now almost covered with new erected buildings, from the ditch at the end of Great Surry-street, or Burrow's Buildings, to the Fishmongers alms-houses, in one direction; and from the Marshalsea prison to the Dog and Duck, in the other direction; with several irregular indentions in its circumference: And where the principal roads meet, an obelisk has been erected, pointing out the distance it stands

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from different parts of London, Westminster, and Blackfriars bridges. Among the buildings which serve to embellish and improve this entrance to London, Chatham-square and Bridge-street-Blackfriars may be particularly specified.

114 Lambeth Palace,

At *Lambeth*, the archbishops of Canterbury have had a palace. According to Mr Pennant, it was in the earlier times a manor, possibly a royal one: for the great Hardiknut died here in 1042, in the midst of the jollity of a wedding dinner; and here, without any formality, the usurper Harold is said to have snatched the crown and placed it on his own head. At that period it was part of the estate of Goda, wife to Walter earl of Mantes, and Eustace earl of Boulogne; who presented it to the church of Rochester, but reserved to herself the patronage of the church. It became in 1197 the property of the see of Canterbury, by exchange transacted between Glanville bishop of Rochester and the archbishop Hubert Walter. The building was improved by Langton the successor of Walter; but it was afterwards neglected and became ruinous. "No pious zeal (says Mr Pennant) restored the place, but the madness of priestly pride. Bonifice, a wrathful and turbulent primate, elected in 1244, took it into his head to become a visitor of the priory of St Bartholomew, to which he had no right. The monks met him with reverential respect, but assured him the office did not belong to the bishop. The meek prelate rushed on the sub-prior, knocked him down, kicked, beat, and buffeted him, tore the cope off his back, and stamped on it like one possessed, while his attendants paid the same compliments to all the poor monks. The people enraged at his unpriestly conduct would have torn him to pieces; when he retired to Lambeth, and, by way of expiation, rebuilt it with great magnificence. At a subsequent period it was very highly improved by the munificent Henry Chichely, who enjoyed the primacy from 1414 to 1443. I lament to find so worthy a man to have been the founder of a building so reproachful to his memory as the Lollards tower, at the expence of near 280l. Neither Protestants or Catholics should omit visiting this tower, the cruel prison of the unhappy followers of Wickliffe. The vast staples and rings to which they were chained before they were brought to the stake, ought to make Protestants bless the hour which freed them from so bloody a religion." During the civil wars of the last century, this palace suffered greatly; but at the Restoration, the whole was repaired by Archbishop Juxton.

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115 and Church.

The parish church of Lambeth (H), which is at a small distance from the palace, has a plain tower; and the architecture is of the Gothic of the time of Edward IV.. It has very little remarkable in it, except the figure of a pedlar and his dog, painted in one of the windows; and tradition says, that the parish was obliged to this man for the bequest of a piece of land, which bears the name of the *Pedlar's Acre*. In the churchyard is the tomb of old Tradescant. Both father and son were great travellers; and the former is supposed to have visited Russia and most parts of Europe, Turkey, Greece, many of the eastern countries, Egypt, and Barbary; out of which he introduced multitudes of plants and flowers, unknown before in our gardens. The monument is an altar tomb; embellished with emblematical sculptures; and bearing the following inscription, which is both singular and historical:

Know, stranger, ere thou pass, beneath this stone
Lye John Tradescant, grandsire, father, son;
The last dy'd in his spring; the other two
Liv'd till they had travell'd Art and Nature through,
As by their choice collections may appear,
Of what is rare, in land, in sea, in air;
Whilst they (as Homer's Iliad in a nut)
A world of wonders in one closet shut:
These famous Antiquarians, that had been
Both gardeners to the Rose and Lily Queen,
Transplanted now themselves, sleep here; and when
Angels shall with their trumpets waken men,
And fire shall purge the world, these hence shall rise,
And change this garden for a paradise.

116 Lambeth Marsh.

From Lambeth, eastward along the river side, was once a long tract of dreary marsh, and still in parts called *Lambeth Marsh*; about the year 1560, there was not a house on it from Lambeth palace as far as Southwark. In a street called *Narrow-wall* (from one of the ancient embankments) is Mrs Conde's noted manufactory of artificial stone (I): And at a small distance, Mess. Beaufoy's (K) great work

117 Great manufactories.

(H) In describing this church, Mr Pennant takes occasion to mention the sad example of fallen majesty in the person of Mary d'Este, the unhappy queen of James II.; who, flying with her infant prince from the ruin impending over their house, after crossing the Thames from the abdicated Whitehall, took shelter beneath the ancient walls of this church a whole hour, from the rain of the inclement night of December 6. 1688. Here she waited with aggravated misery, till a common coach, procured from the next inn, arrived, and conveyed her to Gravesend, from whence she sailed, and bade an eternal adieu to these kingdoms.

(I) Her repository consists of several very large rooms filled with every ornament, which can be used in architecture. The statue, the vase, the urn, the rich chimney pieces, and, in a few words, every thing which could be produced out of natural stone or marble by the most elegant chisel, is here to be obtained at an easy rate.

(K) "Where (says Mr Pennant) the foreign wines are most admirably mimicked. Such is the prodigality and luxury of the age, that the demand for many sorts exceeds in a great degree the produce of the native vineyards. We have skilful fabricators, who kindly supply our wants. It has been estimated, that half of the port, and five-sixths of the white wines consumed in our capital, have been the produce of our home wine presses. The product of duty to the state from a single house was in one year, from July 5. 1785 to July 5. 1786, not less than 7363l. 9s. 8½d. The genial banks of the Thames opposite to our capital, yield almost every species of white wine; and, by a wondrous magic, Mess. Beaufoy pour forth the materials for the rich Frontiniac,

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work for making wines, and that for making vinegar (L).

This ground, so profitable to the proprietors, and so productive of revenue to the state, was within memory the scene of low dissipation. Here stood Cuper's garden, noted for its fireworks, and the great resort of the profligate of both sexes. This place was ornamented with several of the mutilated statues belonging to Thomas earl of Arundel, which had been for that purpose begged from his lordship by one Boyder Cuper, a gardener in the family. The great timber yards beneath which these antiquities were found, are very well worthy of a visit. One would fear that the forests of Norway and the Baltic would be exhausted, to supply the wants of our overgrown capital, were we not assured that the resources will successively be increased equal to the demand of succeeding ages.—In this parish are also vast distilleries, formerly the property of Sir Joseph Mawbey; where are seldom less than 2000 hogs, which are fed entirely on grains.

118 3. City and Liberties of Westminster.

III. *City and Liberties of* WESTMINSTER. The city of Westminster derives its name from a *minster*, or abbey, and *west*, on account of its situation with respect to St Paul's cathedral, which was formerly called *Eastminster*. In ancient times this district stood upwards of a mile from the city of London, and contained only two parishes, which were those of St Margaret and St John, with two chapels of ease; but at present it has seven other parochial churches, viz. St Clement's Danes, St Paul's Covent-garden, St Mary's le Strand, St Martin's in the Field's, St Anne's, St James's, and St George's Hanover-square.

Westminster was anciently called *Thorny Island*, from its having been covered with thorn bushes, and encompassed by a branch of the Thames, which is said to have run through the ground now called *St James's Park*, from west to east, and to have rejoined the river at Whitehall.

Till the general dissolution of religious houses, Westminster was subject to the arbitrary rule of its abbot and monks; but in 1541, upon the surrender of William Benson the last abbot, Henry VIII. not only turned it into an honour, but created it the see of a bishop, and appointed for a diocese the whole county of Middlesex, except Fulham, which belonged to the bishop of London. This bishoprick, however, soon after its institution, was dissolved by Edward VI.

119 Government of Westminster.

The city of Westminster is governed by a high steward, an office of great dignity, who is usually one of the first peers in the realm; and is chosen for life by the dean and chapter of the collegiate church of St Peter. There is also a deputy steward and a high bailiff, who also hold their offices for life; being nominated by the dean and chapter, and confirmed by the high steward.

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The dean and chapter are invested with an ecclesiastical and civil jurisdiction within the liberties of Westminster, St Martin's le Grand, near Cheapside, in the city of London, and some towns in Essex, which are exempted from the jurisdiction of the bishop of London and the archbishop of Canterbury.

120 Churches.

St Margaret's Church was founded by Edward the Confessor, since which time it has been frequently rebuilt. In the east end of this church is a window curiously painted, with the history of the crucifixion, and with the figures of several apostles and saints finely executed. It formerly belonged to a private chapel at Copt-hall, near Epping in Essex, and was purchased by the officers of this parish, some years ago for 400 guineas. In this church the house of commons attends divine service on state holidays.

The *church of St John the Evangelist* was erected in 1728, and having sunk considerably whilst it was building, occasioned an alteration of the plan. On the north and south sides are magnificent porticoes, supported by vast stone pillars, as is also the roof of the church; at each of the four corners is a beautiful stone tower and pinnacle, which were added with the view of making the whole structure sink equally. The parts of this building are held together by iron bars, which run across even the aisles.

121 Westminster Abbey, and its Chapels.

The most remarkable structure in Westminster is the *abbey-church of St Peter*. On its site stood once a temple of Apollo, which according to tradition was thrown down by an earthquake in the time of Antoninus Pius; and from the ruins of which Sebert king of the West Saxons raised a Christian church, which was ruined by the Danes. It was repaired by Edward the Confessor, and given to a few monks; and this spot he chose for his burial-place. Henry III. 160 years after, took down this fabric of Edward's, and erected a new church, which was 50 years in building. It suffered much by fire in 1274, but was repaired by Edward I. Edward II. and the abbots. In 1700 this church being much decayed, the parliament granted money for repairing it, and has frequently repeated the bounty since that time. The form of the abbey is that of a long cross:

Frontiniac, to the more elegant tables; the Madeira, the Calcavella, and the Lisbon, into every part of the kingdom."

(L) "There is a magnificence of business (our author remarks) in this ocean of sweets and sours that cannot fail exciting the greatest admiration; whether we consider the number of vessels or their size. The boasted tun at Heidelberg does not surpass them. On first entering the yard, two rise before you, covered at the top with a thatched dome; between them is a circular turret, including a winding staircase, which brings you to their summits, which are above 24 feet in diameter. One of these conservatories is full of sweet wine, and contains 58,109 gallons, or 1815 barrels of Winchester measure. Its superb associate is full of vinegar, to the amount of 56,799 gallons, or 1774 barrels of the same standard as the former. The famous German vessel yields even to the last by the quantity of 40 barrels.—Besides these, is an avenue of lesser vessels, which hold from 32,500 to 16,974 gallons each. After quitting this Brobdignagian scene, we pass to the acres covered with common barrels: we cannot diminish our ideas so suddenly, but at first we imagine we could quaff them off as easily as Gulliver did the little hogsheads of the kingdom of Lilliput."

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cross: its greatest length is 489 feet, and the breadth of the west front 66 feet; the length of the cross aisle is 189 feet, and the height of the roof 92 feet. At the west end are two towers: the nave and cross aisle are supported by 50 slender pillars of Sussex marble exclusive of pilasters. In the upper and lower ranges there are 94 windows, all which, with the arches, roofs, and doors, are in the Gothic taste. The inside of this church is much better executed than the outside: and the perspective is good; particularly that of the grand aisle. The choir, from which there is an ascent by several steps to a fine altar-piece, is paved with black and white marble; having 28 stalls on the north, the same number on the south, and eight at the west end. The altar is made of a beautiful piece of marble, the gift of Queen Anne, enclosed by a curious balustrade, and upon a pavement of porphyry, jasper, Lydian, and serpentine stones, laid in the mosaic style, at the expence of Abbot Ware, A. D. 1272; and is said to be one of the most beautiful of its kind in the world. On each side of this altar a door opens into St Edward's chapel; round which are 10 other chapels, ranging from the north to the south cross aisles, and are dedicated, 1. To St Andrew. 2. To St Michael. 3. To St John Evangelist. 4. Islip's chapel. 5. To St John Baptist. 6. To St Paul. 7. Henry V.'s chapel. 8. To St Nicholas. 9. To St Edmund. 10. To St Benedict.

In St Edward's chapel are still to be seen the remains of his shrine; which, though now in obscurity, and robbed of all its riches and lustre, was once esteemed the glory of England, so far as art and riches could make it. Here are the tombs of King Edward I. and several other kings and queens of England; and here also is shown the famous chair in which the kings of Scotland used to be crowned at Scone. Henry V.'s chapel is divided from St Edward's by an iron screen, on each side of which are statues as big as life.—St Andrew's chapel, which is next the north cross, and the others which surround the choir, are crowded with the monuments of noble personages, worthy the attention of the curious.—At the corner of St Benedict's chapel, an iron gate opens into the south cross aisle; which from the number of monuments erected therein to celebrated English poets, has obtained the name of the *Poets corner*: though here we find a most magnificent monument erected at the south end in memory of the late John duke of Argyle and Greenwich; another to William Camden the antiquarian; and others to the celebrated divine Dr Isaac Barrow, to Thomas Parr who died at the age of 152 years, &c.—The south aisle is adorned with 19 curious monuments of the pious, the brave, and the learned; and turning northward from the west door, we view a great number more.

122 Henry VII.'s chapel.

On the east of the abbey, and which, though separate from the other chapels in the choir, seems to be one and the same building with the abbey, stands the chapel of King Henry VII. which that king founded in the year 1502, and was at that time styled the *wonder of the world*, and is now one of the most expensive remains of the ancient English taste and magnificence. There is no looking upon it without admiration: it conveys an idea of the fine taste of Gothic architecture in that age; and the inside is so noble, majestic, and of such curious workmanship, that it would take a volume to describe each part with justice and propriety.

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Its original intention was to be a dormitory for the royal blood: and so far the will of the founder has been observed, that none have been interred therein but such as have traced their descent from ancient kings. The tomb of King Henry VII. is most magnificent, enclosed with a screen of cast brass, most admirably designed, and as well executed. Within the rails are the figures of that king and his royal consort, in their robes of state, on a tomb of black marble: and at the head of this tomb lie the remains of Edward VI. In different parts of this chapel are the monuments of Lewis Stewart duke of Richmond, George Villars duke of Buckingham, John Sheffield duke of Buckingham, Charles Montague marquis of Halifax, Edward V. and his brother Richard; the vault of James I. and his queen Anne and daughter Mary; on which is a small tomb adorned with the figure of a child; a lofty monument of Queen Elizabeth, and another of Mary queen of Scots; the monuments for Margaret Douglas daughter of Margaret queen of Scots, Margaret countess of Richmond mother to Henry VII. the vault of King Charles II. and William III. Queen Mary his consort, Queen Anne, and Prince George. Over these royal personages are their effigies (except that of Prince George) in wainscot presses, made of wax to resemble life, and dressed in their coronation robes. And at the corner of the great east window, in another wainscot press, stands the effigy of Mary duchess of Richmond, daughter to James duke of Richmond and Lenox, dressed in the very robes she wore at the coronation of Queen Anne. On leaving the aisle, you are shown another press, containing the effigy of General Monk, who, on account of his loyalty, and the part he took in the restoration of King Charles II. had a vault appropriated to him and his family amongst the royal blood.

In a fine vault under Henry the VII.'s chapel, is the burying place of the present royal family, erected by his late majesty King George II. Adjoining to the abbey are the cloisters, built in a quadrangular form, with piazzas towards the court, where several of the prebendaries have their houses.

123 Westminster School

Near the abbey church is the King's school, usually called *Westminster school*. It was originally founded in 1070, and a second time by Queen Elizabeth in 1560, whence it is sometimes called the *Queen's College*; and is at present one of the greatest schools in the kingdom. The learned antiquary Mr Camden was once master of it, and Ben Johnson one of his scholars. Dr Busby, who was master upwards of 50 years, greatly contributed to keep up its reputation, formed its museum, and improved both the master's and his prebendal house.—This school, instead of one master and one usher as at first, has now an upper and under master, and five ushers, who have about 400 youths under their tuition. A plan was set on foot when the present archbishop of York was master, for building a college for the use of the students, but this did not succeed.

124 Westminster hall.

On the north-east side of the abbey is an old Gothic building called *Westminster-hall*, first built by William Rufus as an addition to a royal palace, and afterwards

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wards rebuilt by Richard II. in the year 1397. It is reckoned one of the largest rooms in Europe, being 200 feet long, 70 broad, and 90 high, supported only by buttresses. The roof is of timber, and was some years ago slated, the old covering of lead being reckoned too heavy. It is paved with stone. In this spacious room the kings of England have generally held their coronation and other solemn feasts; and it is used for the trial of peers. Since the reign of Henry III. the three great courts of Chancery, King's Bench, and Common Pleas, have been held in separate apartments of this hall; and the court of Exchequer above stairs.

125 House of Commons.

Adjoining to the south-east angle of Westminster-hall is a building formerly called *St Stephen's Chapel*, from its having been dedicated to that saint. It was founded by King Stephen; and in 1347 was rebuilt by King Edward III. who converted it to a collegiate church; but since it was surrendered to Edward VI. it has been used for the assembly of the representatives of the commons of England, and is now generally called the *House of Commons*. The benches, which ascend behind one another as in a theatre, are covered with green cloth; the floor is matted; and round the room are wainscot galleries, supported by cantilevers adorned with carved work, in which strangers are often permitted to sit and hear the debates.

126 House of Lords.

On the south side of the hall is the *House of Lords*, so called from being the place where the peers of Great Britain assemble in parliament. It is an oblong room, not quite so large as the house of commons; and is hung with fine old tapestry, representing the defeat of the Spanish Armada in 1500. The design was drawn by Cornelius Vroom, and the tapestry executed by Francis Spiering. It was not put up till the year 1650, two years after the extinction of monarchy, when the house of lords was used as a committee room for the house of commons. The heads of the naval heroes who commanded on the glorious day, form a matchless border round the work, animating posterity to emulate their illustrate example. Here is a throne for the king, with seats on the right and left for such peers of the realm as are of the blood royal. Before the throne are three broad seats; on the first of which, next the throne, sits the lord chancellor, or keeper of the great seal, who is speaker of the house of peers; and on the other two sit the judges, the master of the rolls, or the masters in chancery, who attend occasionally to give their opinions on points of law. The two archbishops sit at some distance from the throne on the right hand, and the other bishops in a row under them. All the benches are covered with red cloth stuffed with wool. Here likewise, by an order of the house, a gallery for strangers has been erected.

127 Prince's Chamber, &c.

Adjoining to the house of lords is the *Prince's Chamber*, where the king is robed when he comes to the parliament. On the other side is the *Painted Chamber*, which is said to have been Edward the Confessor's bed chamber, and the room in which the parliaments were anciently opened. Here conferences are often held between the two houses, or their committees. Contiguous to those is an apartment called the *Court of Requests*, where such as have business in either house may attend,

Near these buildings is a bridge over the Thames, called *Westminster Bridge*, accounted one of the most complete and elegant structures of the kind in the known world. It is built entirely of stone, and extends over the river at a place where it is 1223 feet broad: which is above 380 feet broader than at London bridge. On each side is a fine balustrade of stone, with places of shelter from the rain. The width of the bridge is 44 feet, having on each side a fine foot way for passengers. It consists of 14 piers, and 13 large and two small arches, all semicircular, that in the centre being 76 feet wide, and the rest decreasing four feet each from the other, so that the two least arches of the 13 great ones are each 52 feet. It is computed that the value of 40,000l. in stone and other materials is always under water. This magnificent structure was begun in 1739, and finished in 1750, at the expence of 389,000l. defrayed by the parliament. It was built after the design of M. Labelye, an ingenious architect, a native of France.

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128 Westminster Bridge.

129 Whitehall.

On the bank of the Thames, at the east confines of St Margaret's parish, was a palace called *Whitehall*, originally built by Hubert de Burgh, earl of Kent, before the middle of the 13th century. It afterwards devolved to the archbishop of York, whence it received the name of *York Place*, and continued to be the city residence of the archbishops till it was purchased by Henry VIII. of Cardinal Wolsey in 1530. At this period it became the residence of the court; but in 1697 was destroyed by accidental fire, all except the Banqueting-house, which had been added to the palace of Whitehall by James I. according to a design of Inigo Jones. This is an elegant and magnificent structure of hewn stone, adorned with an upper and lower range of pillars, of the Ionic and Composite orders; the capitals are enriched with fruit and foliages, and between the columns of the windows. The roof is covered with lead, and surrounded with a balustrade. The building chiefly consists of one room of an oblong form 40 feet high, and a proportionable length and breadth. The ceiling is painted by the celebrated Sir Peter Paul Rubens. It is now used only as a chapel-royal, and the other part of the house is occupied with state offices.

130 Horse Guards.

Opposite the Banqueting-house stands the *Horse Guards*, so called from being the station where that part of his majesty's troops usually do duty. It is a strong building, of hewn stone, consisting of a centre and two wings. In the former is an arched passage into St James's Park; and over it, in the middle, rises a cupola. In a part of the building is the War Office. Near the Horse-guards is the *Treasury*; a large building, which fronts the Parade in St James's Park; and where the board of treasury is kept.

131 Admiralty Office.

Eastward of the Horse-guards is the *Admiralty Office*, a large pile, built with brick and stone. The front towards Whitehall has two deep wings, and a lofty portico supported by four large stone pillars. A piazza, consisting of beautiful columns, runs almost from one end to the other. The wall before the court has been lately built in an elegant manner, and each side of the gate is ornamented with naval emblems. Besides a hall, and other public apartments, here are spacious houses for seven commissioners of the admiralty.

At a little distance from the Admiralty, where three

capital

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capital streets terminate, is a large opening called *Charing-cross*, from one of the crosses which King Edward I. caused to be erected in memory of his queen Eleanor, and *Charing* the name of a village in which it was built. The cross remained till the civil wars in the reign of Charles I. when it was destroyed by the fanatics, as a monument of popish superstition; but after the Restoration, an equestrian statue of Charles I. was set up in its stead. This, which is of brass, and finely executed, continues to be an ornament to the place. It was made in 1633, at the expence of the Howard-Arundel family. The parliament sold it to a brazier in Holborn, with strict orders to break it to pieces; but he concealed it under ground till the Restoration, when it was set up in 1678.

132 Charing-cross.

133 Queen's Palace.

At the west end of the Moll, in St James's park, which begins near Charing-cross, stands the *Queen's Palace*. It was originally known by the name of *Arlington House*; but being purchased by the late duke of Buckingham's father, who rebuilt it from the ground in 1703, it was called *Buckingham House*, till the year 1762, when it was purchased by his majesty for a royal residence. It is built of brick and stone, having in the front two ranges of pilasters of the Corinthian and Tuscan orders. It has a spacious court yard, enclosed with iron rails, fronting St James's park, with offices on each side, with two pavilions, separated from the mansion house by colonnades of the Tuscan, Doric, and Ionic orders. His majesty has here built a fine library, in an octagonal form, besides several other additions.

134 St James's.

Eastward of the queen's palace stands *St James's*, an old building, which, till the former was purchased by the crown, had been the town residence of the royal family since the burning of Whitehall in 1697. This palace was built by Henry VIII. and obtained its name from an hospital which formerly stood on the spot. It is an irregular building, of a mean appearance without, but contains several magnificent apartments. Here the court and levees are still kept, and most of the persons belonging to the household have their residence. The chapel of the hospital was converted to the use of the royal family, as it now remains, and is a royal peculiar, exempted from all episcopal jurisdiction.

135 The Park and Mall.

When this palace was built, it abutted in the south-west upon an uncultivated swampy tract of ground, which the king enclosed and converted into a park, called from the palace *St James's park*. He also laid it out into walks, and collected the water into one body. It was afterwards much enlarged and improved by King Charles II. who planted it with lime trees, and formed a beautiful vista, near half a mile in length, called the *Mall*, from its being adapted to a play at bowls distinguished by that name. He also formed the water into a canal 100 feet broad and 2800 feet long; and furnished the park with a decoy, and other ponds for water-fowl; but these have lately been destroyed, on account of the unwholesome vapours which they excited.

In a line with St James's palace, on the east side, is *Marlborough-house*, which belongs to the duke of Marlborough, and is a large brick edifice, ornamented with stone.

136 The Strand, when first formed.

Eastward from Charing-cross, runs that fine street the *Strand*, which terminates at Temple-bar. In the year 1353 the whole of it was an open high way, with gardens to the water side. In that year it was so ruinous, that Edward III. by an ordinance directed a tax to be raised upon wool, leather, wine, and goods carried to the staple at Westminster, from Temple-bar to Westminster abbey, for the repair of the road; and that all owners of houses adjacent to the high way should repair as much as lay before their doors. Before the above period, it entirely cut off Westminster from London; nothing intervened except the scattered houses, and a village which afterwards gave name to the whole; and St Martin's stood literally in the fields. But about the year 1560 a street was formed, loosely built; for all the houses on the south side had great gardens to the river, were called by their owners names, and in after-times gave name to the several streets that succeeded them, pointing down to the Thames; each of them had stairs for the conveniency of taking boat, of which many to this day bear the names of the houses. As the court was for centuries either at the palace of Westminster or Whitehall, a boat was the customary conveyance of the great to the presence of their sovereign. The north side was a mere line of houses from Charing-cross to Temple-bar; all beyond was country. The gardens which occupied part of the site of Covent-garden were bounded by fields, and St Giles's was a distant country village. Our capital found itself so secure in the vigorous government of Queen Elizabeth, that, by the year 1600, most considerable additions were made to the north of the long line of street just described. St Martin's-lane was built on both sides. St Giles's church was still insulated: but Broad-street and Holborn were completely formed into streets with houses all the way to Snow-hill. Covent-garden and Lincoln's inn-fields were built, but in an irregular manner. Drury-lane, Clare-street, and Long-acre, arose in the same period.

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137 Northumberland House.

Almost contiguous to Charing-cross, and upon the south side of the Strand, is that noble palace called *Northumberland House*, which stands on the site of the hospital of St Mary Rounceval. Henry VIII. granted it to Sir Thomas Caverden. It was afterwards transferred to Henry Howard earl of Northampton; who, in the time of James I. built here a house, and called it after his own name. He left it to his kinsman the earl of Suffolk, lord treasurer: and by the marriage of Algernon Percy Earl of Northumberland, with Elizabeth daughter of Theophilus earl of Suffolk, it passed into the house of the present noble owner. The greater part of the house was built by Bernard Jansen, an architect in the reign of James I. The front next the street was begun by Algernon in 1748, and finished by the present duke, who married his daughter. Two additional wings to the front next the Thames, and a variety of other improvements both in building and furniture, have contributed to render this house the largest and most magnificent in London. It contains a gallery of 106 feet long by 26 wide, most superbly furnished.

138 Durham Yard.

A short way eastward, on the same side, stood *Durham Yard*, which took its name from a palace built originally by the illustrious Thomas de Hatfield, elected bishop of Durham in 1345: designed by him for the town residence of him and his successors. At this place,

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in 1540, was held a most magnificent feast, given by the challengers of England, who had caused to be proclaimed, in France, Flanders, Scotland, and Spain, a great and triumphant justing to be holden at Westminster, for all comers that would undertake them. But both the challengers and defendants were English.

138 The Adelphi.

Durham-yard is now filled with a most magnificent mass of building, called the *Adelphi*, in honour of two brothers, the ingenious Adams, its architects. Besides its fine lodgings, it is celebrated for its enchanting prospect, the utility of its wharfs, and its subterraneous apartments answering a variety of purposes of general benefit.

139 Somerset House.

A little to the eastward stood *Somerset-House*, a palace built by Somerset the protector in the time of Edward VI.; and to make way for which he demolished a great number of buildings without making any recompense to the owners. Part of the church of St John of Jerusalem and the Tower were blown up for the sake of the materials; and the cloisters on the north side of St Paul's, with the charnel house and chapel, underwent the same fate; the tombs being destroyed, and the bones thrown into Finsbury-fields. This happened in 1549; but it is probable that he did not live to inhabit the palace he built, as he was executed in the year 1552. After his death the palace fell to the crown; and it became an occasional place of residence, first to Queen Elizabeth, and afterwards to Catherine queen to King Charles II. It was built in a style of architecture compounded of the Grecian and Gothic; and the back, front, and water-gate, were done from a design of Inigo Jones, about the year 1623. A chapel was begun the same year by that architect, and finished some time after. The whole of this structure was demolished in 1775, in consequence of an act of parliament; and a most magnificent edifice, from a design by Sir William Chambers, has been erected for the accommodation of all the public offices,—those of the Treasury, the Secretary of State, the Admiralty, the War, and the Excise, excepted. The Royal Society, and the Society of Antiquarians, hold their meetings here, in apartments which have been allotted to them by royal munificence; and here also are annually exhibited the works of the British painters and sculptors. The terrace on the south side is a walk bounded by the Thames, and unparalleled for grandeur and beauty of view.

140 St Martin's and other churches.

The church of St Martin is distinguished by the name of *St Martin's in the Fields*, from its situation, which was formerly a field, with only a few scattered houses. The church being decayed, was rebuilt by Henry VIII. and again by James I. but not being large enough to accommodate the inhabitants of the parish, it was augmented in 1607, at the charge of Prince Henry, eldest son of James I. and several of the nobility. After many expensive reparations, however, it was entirely taken down in 1720, and a new church begun, which was finished in 1726. This is an elegant edifice, built of stone. On the west front is a noble portico of Corinthian columns, supporting a pediment, in which are represented the royal arms in bas relief. The ascent to the portico is by a flight of very long steps. The length of this church is about 140 feet, the breadth 60, and height 45. It has a fine arched roof sustained by stone columns of the Corinthian order. The steeple has a beautiful spire, and one of the best rings of bells in London.

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St James's Church was built in the reign of Charles II. at the expence of Henry earl of St Alban's, and other neighbouring inhabitants. The building is of brick and stone, about 85 feet long, 60 broad, and 45 feet high, with a handsome steeple 150 feet in height.

St George's Church, near Hanover-square is a beautiful structure. This was one of the fifty new churches erected within the reign of Queen Anne. The ground for the edifice was given by the late Lieutenant-general Stewart, who also left 4000l. to the parish, towards erecting and endowing a charity school; which, by additional benefactions and subscriptions, is become very considerable.

141 Covent Garden.

The greater part of the parish of *St Paul's Covent-garden*, was anciently a garden, belonging to the abbot and convent of Westminster, and was then called *Convent garden*, a name corrupted into Covent, and more generally Common-garden. In 1552, Edward VI. gave it to the earl of Bedford, with an adjoining field, formerly called the *Seven Acres*, but now, being turned into a long street, called *Long-acre*. The church of St Paul's, Covent-garden, was built by Inigo Jones, and was esteemed one of the most simple and perfect pieces of architecture in England. It was burnt by accident a few years ago; but has since been rebuilt in a very plain style. In the area before the church, of about three acres of ground, is *Covent garden market*, which is the best in England for herbs, fruit, and flowers. On the north, and part of the east side, is a magnificent piazza, designed by Inigo Jones.

142 St Mary le Strand, &c.

Next to the parish of St Paul, Covent-garden, is that of *St Mary le Strand*. This is also one of the fifty new churches built in the reign of Queen Anne, and is a handsome piece of architecture, though not very extensive. At the entrance, on the west side, is an ascent by a flight of steps, in a circular form, which leads to a similarly shaped portico of Ionic columns, covered with a dome, that is crowned with a vase. The columns are continued along the body of the church, with pilasters of the same order at the corners; and in the intercolumniations are niches handsomely ornamented. Over the dome is a pediment supported by Corinthian columns, which are also continued round the body of the structure, over those of the Ionic order. A handsome balustrade is carried round the top of the church, and adorned with vases.

A little eastward from the preceding church is that of *St Clement's Danes*, situated likewise in the Strand. A church is said to have stood in this place since about the year 700; but the present structure was begun in 1680, designed by Sir Christopher Wren. It is built of stone, with two rows of windows, the lower plain, but the upper ornamented; and the termination is by an attic, the pilasters of which are covered with vases. On the south side is a portico, covered with a dome supported by Ionic columns; and opposite to this is another. The steeple is beautiful, and of a great height.

The *church of St George*, Bloomsbury, is also one of the fifty new churches erected by act of parliament. It is distinguished from all the rest by standing south

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and north, and by the statue of King George I. at the top of its pyramidal steeple.

143 Foundling and other Hospitals.

In Lamb's Conduit-fields, on the north side of the town, is a large and commodious structure called the *Foundling Hospital*, for the reception of exposed and deserted children. This laudable charity was projected by several eminent merchants in the reign of Queen Anne; but was not carried into execution till many years afterwards, when a charter for its establishment was obtained, through the indefatigable assiduity of Mr Thomas Coram, the commander of a merchant vessel, who spent the remainder of his life in promoting this design. From the time of its institution, the parliament has occasionally granted considerable sums for its support; and in some years upwards of 6000 infants have been received.

Not far from hence is an *Hospital for the Smallpox*; and in different parts of the town there are others, either for the sick of all kinds, or those in particular circumstances. Of the latter are several *Lying-in hospitals*, and the *Lock Hospital* for female patients in the venereal disease. Of the former are *St George's* and *Middlesex Hospitals*, besides several infirmaries.

144 Gray's Inn.

Gray's Inn is one of the four principal inns of court; which, though situated within the limits of the parish of St Andrew, Holborn, is yet without the liberties of the city of London. It took its name from an ancient family of the name of Gray, which formerly resided here, and in the reign of Edward III. demised it to some students in the law; but it is said to have been afterwards conveyed to the monks of Shene, near Richmond in Surry, who leased it to the society of the Inn. It was held by this tenure till the dissolution of the monasteries, when Henry VIII. granted it to the society in fee-farm. This inn consists chiefly of two quadrangles, and has an old hall well built of timber, with a chapel in the Gothic style. Here is also a good library, and the inn is accommodated with a spacious garden.

145 Lincoln's Inn.

Lincoln's Inn, another of the four principal inns of court, was originally the palace of Ralph Neville bishop of Chichester, and chancellor of England about the year 1226. It afterwards devolved to the earl of Lincoln, who converted it into a court for the students of law about the year 1310. From him it received the name of *Lincoln's Inn*, and consisted only of what is now called the old square, which is entered from Chancery-lane. At present this square contains, besides buildings for the lawyers, a large hall where the lord chancellor hears causes in the sittings after term. To this inn belongs likewise a fine garden, which has lately been diminished by the building of some large and commodious offices, for the use of the six clerks in the court of chancery, &c.

146 Charter-House.

In the parish of St James, Clerkenwell, is an hospital called the *Charter-house*, which is a corruption of the word *chartreux*, a name formerly used for a convent or priory of the Carthusians, which this place formerly was. After the dissolution of monasteries it fell to the earl of Suffolk, who disposed of it to Thomas Sutton, Esq. a citizen of London, in the time of King James I. for 13,000l. The purchaser intending it for an hospital, applied to the king for a patent, which he obtained in 1611, and the grant was confirmed by parliament in 1623. Mr Sutton having expended 7000l. in fitting up the buildings, gave it the name of *King James's Hospital*, and endowed it with lands to the amount of near 4500l. a-year, for the maintenance of 80 gentlemen, merchants or soldiers, who should be reduced to indigent circumstances; and 40 boys, to be instructed in classical learning. The men are provided with handsome apartments, and all the necessaries of life except clothes; instead of which each of them is allowed a gown, and 7l. a-year. Of the boys, 29 are at a proper time sent to the university, where each has an allowance of 20l. a-year for eight years. Others, who are judged more fit for trade, are put out apprentices, and the sum of 40l. is given with each of them. As a farther encouragement to the scholars, there are nine ecclesiastical preferments in the gift of the governors. It is also by the recommendation of the latter that all pensioners and youths are received into the hospital. They consist of 16, of which number the king is always one, and the others are generally noblemen of the first rank. To this hospital belong a master, a preacher, two schoolmasters, a physician, a register, a receiver, a treasurer, a steward, an auditor, and other officers; and the annual revenues of it being now increased to upwards of 6000l. five men and four boys have been added to the original number.

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147 Aske's Hospital.

In the parish of St Luke stands the Haberdashers alms-houses, or *Aske's Hospital*, so called from having been erected by the company of haberdashers, pursuant to the will of Robert Aske, Esq. one of the members, who left 30,000l. for the building and the relief of 20 poor members of the company; besides the maintenance and education of 20 boys, sons of decayed freemen of the same company. This is a large edifice of brick and stone, 400 feet long, with a piazza in front 340 feet in length, consisting of stone columns of the Tuscan order. In the middle of the building is a chapel, adorned with columns, entablatures and pediment, of the Ionic order; under the pediment is a niche with a statue of the founder. In the same parish is the Ironmongers hospital, likewise a large building.

In the parish of St Mary, Whitechapel, stands the *London Hospital*, for the reception of the sick. It is a large building, and was erected a few years since by voluntary contribution. Here are also some considerable alms-houses.

148 Houses of the nobility.

Within the precincts of Westminster are several stately houses belonging to the nobility, some of which have been already mentioned. Of the others, the most remarkable at present are, Burlington-house, Devonshire-house, Egremont-house, and Bedford-house; Carleton-house, the magnificent abode of the prince of Wales; and the superb residence erected by the duke of York between the Treasury and the Horse-guards.

149 British Museum.

To these may be added, *Montagu-house* (now the British Museum); which was built on a French plan by the first duke of Montagu, who had been ambassador in France. The staircase and ceilings were painted by Rousseau and La Fosse: the apotheosis of Iris, and the assembly of the gods, are by the last. It was purchased of the duke's heirs by parliament, for uniting together the Royal, Cottonian, Harleian, Sloanian, and other collections of books, MSS. coins, antiquities, subjects in natural history, &c. &c. for the public use, for which it is excellently adapted. The first of these

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these libraries contains the books and MSS. of our princes from Henry VII. to Charles II.; the second the MSS. collected by Sir John Cotton, his son, and grandson Sir John, which last gave it to the public by act 12 and 13 Will. III. c. 7. The Harleian collection of MSS. was formed by Edward earl of Oxford, and purchased by government in 1753, at the same time with the library, MSS. and natural curiosities, of Sir Hans Sloane. This last cost Sir Hans 50,000l.; and he left it by will, to the use of the public, on condition that the parliament would pay 20,000l. to his executors. It comprehends an amazing number of curiosities; among which are, the library, including books of drawings, MSS. and prints, amounting to about 50,000 volumes; medals and coins, ancient and modern, 20,000; cameos and intaglios, about 700; seals, 268; vessels, &c. of agate, jasper, &c. 542; antiquities, 1125; precious stones, agates, jasper, &c. 2256; metals, minerals, ores, &c. 2725; crystal, spars, &c. 1864; fossils, flints, stones, 1275; earths, sands, salts, 1035; bitumens, sulphurs, ambers, &c. 399; tales, micæ, &c. 388; corals, sponges, &c. 1421; testacea, or shells, &c. 5843; echini, echinitæ, &c. 659; asteriæ, trochi, entrochi, &c. 241; crustaceæ, crabs, lobsters, &c. 363; stellæ marinæ, star-fishes, &c. 173; fish, and their parts, &c. 1555; birds, and their parts, eggs, and nests of different species, 1172; quadrupeds, &c. 1886; vipers, serpents, &c. 521; insects, &c. 5439; vegetables, 12,506; hortus siccus or volumes of dried plants, 334; humani, as calculi, anatomical preparations, 756; miscellaneous things, natural, 2098; mathematial instruments, 55. A catalogue of all the above is written in a number of large volumes. It is a large and magnificent building; and has behind it a garden, consisting nearly of nine acres. It has of late been very much enriched by an accession of Egyptian curiosities, chiefly taken from General Menou at Alexandria; by the splendid collection of minerals belonging to the Hon. C. Greville, which was purchased by parliament at the expence of 13,000 sterling; and by the Elgin marbles. All parts of the museum, except the library and coins, may be seen every Monday, Wednesday, and Friday (except during August and September, and in Christmas, Easter, and Whitsun weeks), between the hours of ten and four, without any difficulty or other form than the visitor entering his name, &c. in a book. This regulation was adopted only in 1810, previous to which there was much trouble and delay in procuring admission.

150 Principal squares, &c.

Besides a great number of spacious streets, which are daily increasing, this part of the metropolis is ornamented with several magnificent squares, viz. Grosvenor-square, Berkeley-square, Portman-square, Cavendish-square, Hanover-square, St James's-square, Soho-square, Bloomsbury-square, Queen's-square, Lincoln's Inn-Fields, Leicester-square, Red-Lion-square, &c.

151 London anciently inconvenient and unhealthy.

Before the conflagration in 1666, LONDON (which like most other great cities, had arisen from small beginnings) was totally inelegant, inconvenient, and unhealthy, of which latter misfortune many melancholy proofs are authenticated in history, and which, without doubt, proceeded from the narrowness of the streets, and the unaccountable projections of the buildings, that confined the putrid air, and joined with other circumstances, such as the want of water, rendered the city seldom free from pestilential devastation. The fire which consumed the greatest part of the city, dreadful as it was to the inhabitants at that time, was productive of consequences which made ample amends for the losses sustained by individuals; a new city arose on the ruins of the old; but, though more regular, open, convenient, and healthful, than the former, yet it by no means answered to the characters of magnificence or elegance, in many particulars; and it is ever to be lamented (such was the infatuation of those times), that the magnificent, elegant, and useful plan of the great Sir Christopher Wren, was totally disregarded, and sacrificed to the mean and selfish views of private property; views which did irreparable injury to the citizens themselves, and to the nation in general: for had that great architect's plan been followed, what has often been asserted must have been the result; the metropolis of this kingdom would incontestably have been the most magnificent and elegant city in the universe; and of consequence must, from the prodigious resort of foreigners of distinction and taste who would have visited it, have become an inexhaustible fund of riches to this nation. But as the deplorable blindness of that age has deprived us of so valuable an acquisition, it is become absolutely necessary that some efforts should be made to render the present plan in a greater degree answerable to the character of the richest and most powerful people in the world.

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152 Its plan still defective.

The plan of London, in its present state, will in many instances appear to very moderate judges to be as injudicious a disposition as can easily be conceived for a city of trade and commerce, on the borders of so noble a river as the Thames. The wharfs and quays on its banks are extremely mean and inconvenient; and the want of regularity and uniformity in the streets of the city of London, and the mean avenues to many parts of it, are also circumstances that greatly lessen the grandeur of its appearance. Many of the churches and other public buildings are likewise thrust up in corners, in such a manner as might tempt foreigners to believe that they were designed to be concealed. The improvements of the city of London for some years past have, however, been very great; and the new streets, which are numerous, are in general more spacious, and built with greater regularity and elegance.

153 Great improvements.

The streets, with the exception of a few on the south side of the river which are little frequented, are all well paved; and on each side are flag stones for foot passengers. Underneath the pavements are large vaulted channels, called sewers, which communicate with each house by smaller ones, and with every street by convenient openings and gratings, to carry off all filth that can be conveyed in that manner into the river. A great part of London is now lighted with gas. In the beginning of 1817 the number of gas lights supplied was 76,500, in producing which 28 chalders of coals were consumed daily.

154 Wealth and grandeur of this vast metropolis.

London, then, in its large sense, including Westminster, Southwark, and part of Middlesex, forms one great metropolis, of vast extent and of prodigious wealth. When considered with all its advantages, it is now what ancient Rome once was; the seat of liberty, the encourager of arts, and the admiration of the whole world. It is the centre of trade;

General Description.

has an intimate connexion with all the counties in the kingdom; and is the grand mart of the nation, to which all parts send their commodities, from whence they are again sent back into every town in the nation and to every part of the world. From hence innumerable carriages by land and water are constantly employed: and from hence arises that circulation in the national body which renders every part healthful, vigorous, and in a prosperous condition; a circulation that is equally beneficial to the head and the most distant members. Merchants are here as rich as noblemen; witness their incredible loans to government: and there is no place in the world where the shops of tradesmen make such a noble and elegant appearance, or are better stocked.

155 Its excellent situation for commerce.

The Thames, on the banks of which London is situated, is a river which, though not the largest, is the richest and most commodious for commerce of any in the world. It is continually filled with fleets, sailing to or from the most distant climates; and its banks, from London-bridge to Blackwall, form almost one continued great magazine of naval stores; containing numerous wet docks, dry docks, and yards for the building of ships, for the use of the merchant; besides the places allotted for the building of boats and lighters, and the king's yards lower down the river for the building of men of war.

One of the greatest modern improvements to the port of London was the erection of docks, which are justly deemed the most wonderful works of the kind in the world. The first, the West India docks, were begun in 1800, and completed in 1802. The several basins of which they consist, and the canal connecting them with the river, cover 60 acres. They are kept always full by locks. The northern or import dock is 2600 by 510 feet, and 29 feet deep. It will hold between 200 and 300 ships. The export dock on the south side is 2600 by 400 feet, and 29 feet deep. An open shed along the whole line of the water in front of the warehouses, receives the cargoes, which are hoisted up to the warehouses by cranes. In these docks 460 vessels have been discharged in the space of 6 months. The East India docks, which are situated a little below Blackwall, were built in 1805. The discharging dock is 1410 feet long and 560 wide, containing 18½ acres. The loading dock is 780 feet long and 520 wide, containing 9¼ acres: the depth of both is 30 feet. The London dock, erected in 1803, is built in the angle of the river below Wapping, between Ratcliff highway and the Thames: it covers 20 acres. Its length is 1262 feet, and width 690: its depth is 27 feet. It is capable of receiving 230 vessels of 300 tons. The warehouses for storing tobacco and wine cover 5 acres; and the whole is surrounded by a wall.

As the city is about 60 miles distant from the sea, it enjoys, by means of this beautiful river, all the benefits of navigation, without the danger of being surprised by foreign fleets, or of being annoyed by the moist vapours of the sea. It rises regularly from the water-side, and, extending itself on both sides along its banks, reaches a prodigious length from east to west in a kind of amphitheatre towards the north, and is continued for near 20 miles on all sides, in a succession of magnificent villas and populous villages, the country-seats of gentlemen and tradesmen; whither the latter retire for the benefit of fresh air, and to relax their minds from the hurry of business.

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The irregular form of London makes it difficult to ascertain its extent. However, its length from east to west is generally allowed to be above seven miles from Hyde-park corner to Poplar; and its breadth in some places three, in others two, and in others again not much above half a mile. But taking in the villages included in the population returns, it is supposed to cover 30 square miles.

156 Its great extent.

The population of London, though much enlarged during the last century, did not increase quite so fast as the population of the country parts of England. London, according to the population abstract, contained in 1700, 674,350 inhabitants, which was nearly *one-eighth* of the population of England; but in 1801 it contained 900,000, which is rather less than one-tenth of the population of England. In 1811 the population of the capital, including that of the villages actually adjoining or closely connected with it, was by the returns 1,071,662. During the period between 1801 and 1811, the population of London increased between 12 and 13 per cent, while that of England increased 14½ per cent. The population of what is called properly the *city*, has diminished since 1700; this arises from buildings formerly occupied as dwelling-houses, being now used as warehouses, &c. and also from a greater space being occupied by wider streets, and the houses being larger.

The mortality in London has considerably diminished since 1700. In that year it was 19,443, or 1 in 25; since 1801 it has been about 1 in 38. In 1817 there were buried 19,968, of which 10,033 were males and 9935 females; and in the same year there were christened 24,129, of which 12,624 were males, and 11,505 females.

The mean annual temperature of London is 51°. The temperature of May on an average of eight years is 56.61, of July 66.3, of September 59.63. The greatest usual cold is 20°, and occurs in January. The greatest usual heat is 81°, and occurs in July. The mean height of the barometer is 29.88 at the house of the Royal Society. There are about 209 days in the year without rain, and 156 in which it rains or snows. The average depth of rain during the four last years of the last century was 19 inches. The prevailing winds are the south-west and north-east, the former of which blows on an average 112 days in the year, and the latter 58.

Pauperism has increased greatly in London. The number of persons receiving relief in 1813 was about double of the number in 1803. The average annual expenditure for the poor for the years 1813, 1814, 1815, was 720,000l.; the annual number of persons receiving permanent relief was 36,034, and of persons receiving occasional relief 81,282.

157 General enumeration of churches, chapels, &c.

Beside St Paul's cathedral and the collegiate church at Westminster, there are 114 parish-churches and 62 chapels of the established religion; 17 foreign Protestant chapels; 11 chapels belonging to the Germans, Dutch, Danes, &c.; 26 Independent meetings; 34 Presbyterian meetings; 20 Baptist meetings; 11 Popish chapels, and meeting-houses for the use of foreign ambassadors and people of various sects; and 6 Jews synagogues. So that there are above 300 places devoted

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ted to religious worship in the compass of this vast pile of buildings, without reckoning the 21 out-parishes usually included in the bills of mortality, and a great number of Methodist tabernacles.

158 Hospitals, schools, &c.

There are also in and near this city 100 alms-houses, about 20 hospitals and infirmaries, 3 colleges, 10 public prisons, 15 flesh-markets; one market for live cattle; two other markets more particularly for herbs; and 23 other markets for corn, coals, hay, &c.; 15 inns of court; 27 public squares, besides those within single buildings as, the Temple &c.; 3 bridges, 55 halls for companies, 8 public schools, called free schools; and 131 charity-schools, which provide education for 5034 poor children; 207 inns, 447 taverns, 551 coffeehouses, 5975 alehouses; 1000 hackney-coaches; 400 ditto chairs; 7000 streets, lanes, courts, and alleys, and 160,000 dwelling-houses.

159 Number of inhabitants.

The following was the computed weekly consumption of provisions some years ago, when the population was estimated at one million.

160 Weekly consumpt of provisions.

1000 Bullocks, at 6l. a-piece -	L.6000	0	0
6000 Sheep, at 12s. a-piece -	3600	0	0
2000 Calves at 1l. 4s. a-piece -	2400	0	0
3000 Lambs, at 8s. a-piece for six months, - - -	1200	0	0
1500 Hogs in pork and bacon, at 20s. for six months -	1500	0	0
2000 Pigs, at 2s. 6d. a-piece -	250	0	0
1000 Turkeys, at 3s. 6d. a piece for six months -	175	0	0
1000 Geese, at 2s. 6d. a-piece, for six months, - - -	125	0	0
2000 Capons, at 1s. 8d. a-piece -	166	13	2
500 Dozens of chickens, at 9s. per dozen - - - -	225	0	0
4300 Ducks, at 9d. a-piece -	161	5	0
1500 Dozens of rabbits, at 7s. per dozen, for eight months -	525	0	0
2000 Dozens of pigeons, at 2s. per dozen, for eight months -	200	0	0
700 Dozens of wild fowl, of several sorts, for six months - -	250	0	0
In salt and fresh fish, at 1d. a-day, for half a million of people for a week	14,583	6	8
In bread of all sorts, white and brown, at 1d. a-day, for one million of people for a week - -	29,166	13	4
300 Tons of wine, of all sorts, at 50l. a ton, one sort with another, for one week - - -	15,000	0	0
In milk, butter, cheese. &c. at 1d. a-day, for a million of people for a week - - -	29,166	13	4
In fruit of all sorts, at one farthing a-day, for a million of people for a week - - - - -	7291	13	4
In eggs of hens, ducks, geese, &c. at half a farthing a-day, for a million of people for a week - -	3645	16	4
In beer and ale, strong and small, at 2d. a-day, for a million of people for a week - - -	58,333	6	8
In sugar, plums, and spice, and all sorts of groecry; at a halfpenny a-day, for a million of people for a week	14,583	6	8
In wheat-flour, for pies and puddings, oat-meal and rice, &c. at half a farthing a-day, for a million of people for a week. - -	L. 3645	16	8
In salt, oil, vinegar, capers, olives, and other sances, at half a farthing a-day, for a million of people for a week - - -	3645	16	8
In roots and herbs of all sorts, both for food and physic, at half a farthing a-day, for a million of people for a week - - -	3645	16	8.
In sea-coal, charcoal, candles, and fire-wood of all sorts, at 1d. a-day for a million of people for a week	29,166	13	4.
In paper of all sorts (a great quantity being used in printing) quills, pens, ink, and wax, at a farthing a-day, for a million of people for a week	7291	13	4
In tobacco, pipes, and snuff, at half a farthing a-day, for a million of people for a week - -	3645	16	8
In clothing, as linen and woollen, for men, women, and children, shoes, stockings, &c. at 3s. 6d. per week, for a million of people for a week - -	175,000	0	0
Expences for horse-meat, in hay, oats, beans, 1000 load of hay, a-week, at 40s. a load, comes to 2000l. in oats, and beans the like value, 2000l. which is in all, for one week -	4000	0	0
Cyder, mum, brandy, strong waters, coffee, chocolate, tea, &c. at 1d. a-day, for a million of people for one week - - -	29,166	13	4

General Description.

161 Firing porter, &c.

The common firing is pit coal, commonly called *sea coal*, of which there are consumed upwards of 766,880 chaldrons every year. The annual consumption of oil in London and Westminster for lamps, amounts to 400,000l. In 1787, the quantity of porter brewed in London for home consumption and foreign exportation, amounted to 1,176,856 barrels. In 1805 it amounted to 1,200,000 barrels of 36 gallons each.

The above was the weekly consumption of the articles specified a few years ago. The following is the annual consumption of some of them estimated since the year 1800. Bullocks 110,000: sheep and lambs 776,000: calves 210,000: hogs 210,000: sucking pigs 60,000: milk in gallons 6,980,000; for which the inhabitants pay 481,666l. and this is the produce of 8500 cows: vegetables and fruit 3,000,000l.: spirituous liquors and compounds 11,146,782 gallons: wine 32,500 tons; butter 16,600,000 pounds: cheese 21,100,000 pounds.

162 Supply of water

This great and populous city is happily supplied with abundance of fresh water from the Thames and the New River; which is not only of inconceivable service to every family, but by means of fire plugs everywhere dispersed, the keys of which are deposited with the parish officers, the city is in a great measure secured from the spreading of fire: for these plugs are no sooner opened, than there are vast quantities of water to supply the engines. This plenty of water has been attended with another advantage, it has given rise.

General Description.

rise to several companies, who ensure houses and goods from fire; an advantage that is not to be met with in any other nation on earth; the premium is small; and the recovery in case of loss is easy and certain. Every one of these offices keeps a set of men in pay, who are ready at all hours to give their assistance in case of fire; and who are on all occasions extremely bold, dexterous, and diligent: but though all their labours should prove unsuccessful, the person who suffers by this devouring element has the comfort that must arise from a certainty of being paid to the value (upon oath) of what he has ensured.

163 Insurance companies.

164 Places of diversion, &c.

The places for diversion are, Vauxhall, Ranelagh-gardens, the two play-houses, the Pantheon, and the little theatre in the Hay-Market, with Sadler's-wells, Hughes's Circus, and Astley's Royal-Grove, &c. Covent-Garden Theatre was burnt down in 1808 and rebuilt in 1809; and Drury-Lane Theatre was burnt down in 1809 and rebuilt in 1811.

The Royal Institution owed its origin to a number of noblemen and gentlemen, who held meetings for the avowed purpose of ameliorating the condition of the poor. They first projected the plan of its foundation, which was matured by the exertions and talents of the indefatigable Count Rumford. The meetings began in 1800, shortly before which his majesty granted the proprietors a charter of incorporation by the name of the *Royal Institution of Great Britain*, for the purpose of facilitating the general introduction of useful mechanical inventions and improvements, and for teaching, by courses of philosophical lectures and experiments, the application of science to the common purposes of life. The government of the society consists of the president, 15 managers, and the secretary, chosen by and from among the proprietors. Of the 15 managers, one-third is elected annually, on the first of May. The house is situated in Albemarle-street, is extremely spacious, and well adapted to the purposes to which it is applied.

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The London Institution was formed in the autumn of 1805, by the indefatigable exertions of a few spirited individuals. The house in the mean time is in the Old Jewry, till the managers can procure a more suitable place. The design of it is to promote the dissemination of science, literature, and the arts: its view at present being confined to three objects, viz. the acquisition of a valuable and extensive library; the diffusion of useful knowledge by the means of lectures and experiments; and the establishment of a reading room, where the foreign and domestic journals are provided for the use of the proprietors and subscribers. The government of the Institution is vested in a president, four vice-presidents, twenty managers, and the secretary. The number of proprietors is limited to 1000, each of whom paid 75 guineas for a share, and the life subscribers pay 25 guineas.

LON

LON

Londonderry.

LONDONDERRY, or COLERAIN, a county of Ireland, in the province of Ulster. It is bounded on the south and south-west by the county of Tyronne; by Antrim on the east, from which it is parted by the river Bann: by Donegal on the west; and that county and the Deucalcedonian ocean on the north. Its length is about 32½ miles, its breadth 25, containing about 511,688 acres. In 1813 it contained 186,000 inhabitants. The bogs and heaths of this county are manured with sea-shells, as those of Donegal. Like that, too, it is pretty champaign, and not unfruitful. It is particularly noted for a very clear river called the *Bann*, abounding with salmon, a fish said to delight in limpid streams. This river, to distinguish it from a lesser of the same name, is called the *Greater* or *Lower Bann*. In order to cultivate, settle, and civilize this county, King James I. granted it by letters patent, to a society, by the name of the *Governor and Assistants at London of the new plantation of Ulster in the realm of Ireland*. It contains four baronies; and besides the two knights of the shire, sends to parliament one member for the city of Londonderry, and one for Colerain. See LONDONDERRY, SUPPLEMENT.

LONDONDERRY, or *Derry*, the capital of the county, and the see of a bishop, stands at the bottom of Lough-Foyle. This city has a very good port, to which ships of the greatest burden have access, and a considerable trade. It will be ever famous for the gallantry and perseverance with which it defended itself in three memorable sieges, in defiance of the greatest hardships and discouragements, namely, 1st, In 1641, when the rebels could not reduce it either by fraud or force. 2dly, In 1649, when it was besieged by the Lord Ardes, and reduced almost to extremity by famine, till at last relieved by troops sent from England. 3dly, When it held out against the French and Irish from the 7th of December 1688, to the last day of July 1689, though it was neither well fortified nor provided with a garrison or stores of provision and ammunition, and hardly any attempt made to relieve it during so long a time. Though the city is 20 miles up the river, yet very large ships can come up to the quay, where there are four or five fathoms of water. It is now well fortified with a strong wall, besides outworks; and along the banks of the river are several castles and a fort. This city is of no great antiquity, having been built and planted in the reign of James I. by a colony sent by the society above mentioned. The trade of the town is very considerable, having not only a large share in the herring fishery, but sending ships also to the West Indies, New England, and Newfoundland, for which they are so advantageously situated, that a vessel bound from thence to America often arrives there before a London ship can get clear of the soundings, or arrive in the latitude of Londonderry. Though there are many shallows in Lough-Foyle, which serves it instead of a road; yet they are easily avoided. There is in the town an Infirmary, a Theatre, and a Linen-Hall. There is also a large and commodious Jail, and an elegant Court-house. The inhabitants of this city are almost all Protestants. It gave the title of *earl* and *baron* to a branch of the family of Pitt, which became extinct in 1764; but part of the title was revived in Robert Stewart, who was created Baron Londonderry

Londonderry.

Londonderry, Long.

derry in 1789. A late traveller says, "Derry is, perhaps, the cleanest, best built, and most beautifully situated town in Ireland; and excepting Cork, as convenient as any for commerce, foreign and domestic." The lake almost surrounds it; and the whole groundplot both of it and its liberties belongs to the 12 great companies of London. The imports are flax seed, hardware, iron, timber, and West India goods. The exports are yarn, linen, salmon salted and barrelled, &c. It contains 18,500 inhabitants, and has a wooden bridge 1068 feet long, which was erected in 1791. Long. 7° 5′ W.; Lat. 55° 4′ N.

LONG, an epithet given to whatever exceeds the usual standard of length.

Long-Boat, the largest and strongest boat belonging to any ship. It is principally employed to carry great burdens, as anchors, cables, ballast, &c. See BOAT.

Long, Roger, D. D. master of Pembroke-hall in Cambridge, Lowndes's professor of astronomy in that university, rector of Cherryhinton in Huntingdonshire, and of Bradwell *juxta mare* in Essex, was author of a well known and much improved treatise of astronomy, and the inventor of a remarkably curious astronomical machine, thus described by himself. "I have, in a room lately built in Pembroke-hall, erected a sphere of 18 feet diameter, wherein above 30 persons may sit conveniently; the entrance into it is over the south pole by six steps; the frame of the sphere consists of a number of iron meridians, not complete semicircles, the northern ends of which are screwed to a large round plate of brass, with a hole in the centre of it; through this hole, from a beam in the ceiling, comes the north pole, a round iron rod, about three inches long, and supports the upper parts of the sphere to its proper elevation for the latitude of Cambridge; the lower part of the sphere, so much of it as is invisible in England, is cut off; and the lower or southern ends of the meridians, or truncated semicircles, terminate on, and are screwed down to a strong circle of oak, of about 13 feet diameter; which, when the sphere is put into motion, runs upon large rollers of lignum vitæ, in the manner that the tops of some windmills are made to turn round. Upon the iron meridians is fixed a zodiac of tin painted blue, whereon the ecliptic and heliocentric orbits of the planets are drawn, and the constellations and stars traced: the Great and Little Bear and Draco are already painted in their places round the north pole; the rest of the constellations are proposed to follow; the whole is turned round with a small winch, with as little labour as it takes to wind up a jack, though the weight of the iron, tin, and wooden circle, is about 1000 pounds. When it is made use of, a planetarium will be placed in the middle thereof. The whole, with the floor, is well supported by a frame of large timber." Thus far Dr Long, before this curious piece of mechanism was perfected. Since the above was written, the sphere has been completely finished; all the constellations and stars of the northern hemisphere, visible at Cambridge, are painted in their proper places upon plates of iron joined together, which form one concave surface. Dr Long published a Commencement Sermon 1728; and an answer to Dr Galley's pamphlet on Greek Accents; and died December 16th, 1770, at the age of 91. As the materials for this article are scanty, we shall subjoin, from the Gentleman's Magazine*, a few traits of him, as delineated in 1769 by Mr Jones. "He is now in the 88th year of his age, and for his years vegete and active. He was lately (in October) put in nomination for the office of vice-chancellor. He executed that trust once before, I think in the year 1737; a very ingenious person, and sometimes very facetious. At the public commencement in the year 1613, Dr Greene (master of Bennet college, and afterwards bishop of Ely) being then vice-chancellor, Mr Long was pitched upon for the tripos-performance; it was witty and humorous, and has passed through divers editions. Some that remembered the delivery of it, told me, that in addressing the vice-chancellor (whom the university wags usually styled *Miss Greene*), the tripos-orator, being a native of Norfolk, and assuming the Norfolk dialect, instead of saying, *Domine Vice-Cancellarie*, did very archly pronounce the words thus, *Domina Vice-Cancellaria*; which occasioned a general smile in that great auditory. His friend the late Mr Bonfoy of Ripton told me this little incident, 'That he and Dr Long walking together in Cambridge in a dusky evening, and coming to a short *post* fixed in the pavement, which Mr B. in the midst of chat and inattention, took to be a *boy* standing in his way, he said in a hurry, 'Get out of my way, boy.' '*That boy, Sir*, said the doctor very calmly and slily, *is a* post-boy, *who turns out of his way for nobody.*'—I could recollect several other ingenious repartees if there were occasion. One thing is remarkable, he never was a hale and hearty man, always of a tender and delicate constitution, yet took great care of it. His common drink water. He always dines with the fellows in the hall. Of late years he has left off eating flesh-meats; in the room thereof, puddings, vegetables, &c. sometimes a glass or two of wine."

Long, Longevity

LONGEVITY, length of life.

From the different longevities of men in the beginning of the world, after the flood, and in these ages, Mr Derham draws an argument for the interposition of a divine Providence.

Immediately after the creation, when the world was to be peopled by one man and one woman, the ordinary age was 900 and upwards.—Immediately after the flood, when there were three persons to stock the world, their age was cut shorter, and none of those patriarchs, but Shem, arrived at 500. In the second century we find none that reached 240: in the third, none but Terah that came to 200 years; the world, at least a part of it, by that time being so well peopled, that they had built cities, and were cantoned out into distant nations. —By degrees, as the number of people increased, their *longevity* dwindled, till it came down at length to 70 or 80 years: and there it stood, and has continued to stand ever since the time of Moses.—This is found a good medium, and by means hereof the world is neither overstocked, nor kept too thin; but life and death keep a pretty equal pace.

That the common duration of man's life has been the same in all ages since the above period, is plain both from sacred and profane history. To pass by others, Plato lived to 81, and was accounted an old man: and the instances of *longevity* produced by Pliny, lib. vii. c. 48. as very extraordinary, may most of them be matched in modern histories.—In the following Table are collected into one point of view the most memorable instances

* For 1783, p. 983.

Longevity. instances of long-lived persons of whose age we have any authentic records. The first and second are extracted from *Mr Whitehurst's Inquiry into the Origin and Strata of the Earth*, with some additions by Dr Fothergill; who inserted them, accompanied by a third, together with a number of useful observations, in the first volume of the Memoirs of the Manchester Literary Society. Longevity.

Names of the Persons.	Age.	Places of Abode.	Living or Dead.
Thomas Parre	152	Shropshire	Died November 16. 1635. Phil. Trans. N° 44.
Henry Jenkins	169	Yorkshire	Died December 8. 1670. Phil. Trans. N° 221.
Robert Montgomery	126	Ditto	Died in — — 1670.
James Sands	140	Staffordshire	Do. Fuller's Worthies,
His Wife	120	Ditto	p. 47.
Countess of Desmond	140	Ireland	Raleigh's Hist. p. 166.
——— Eccleston	143	Ditto	Died — — 1691. (A)
J. Sagar	112	Lancashire	—— — — 1668. (B)
— Laurence	140	Scotland	Living — — (C)
Simon Sack	141	Trionia	Died May 30. 1764.
Col. Thomas Winslow	146	Ireland	—— Aug. 26. 1766.
Francis Consist	150	Yorkshire	—— Jan. — 1768.
Christ. J. Drakenberg	146	Norway	—— June 24. 1770. (D)
Margaret Forster	136	Cumberland	Both living 1771.
——— her daughter	104	Ditto	
Francis Bons	121	France	Died Feb. 6. 1769.
John Brookey	134	Devonshire	Living — — 1777. (E)
James Bowels	152	Killingworth	Died Aug. 15. 1656 (F)
John Tice	125	Worcestershire	—— March 1774. (G)
John Mount	136	Scotland	—— Feb. 27. 1766. (H)
A. Goldsmith	140	France	—— June — 1776. (I)
Mary Yates	128	Shropshire	—— — — 1776. (K)
John Bales	126	Northampton	—— April 5. 1776. (L)
William Ellis	130	Liverpool	—— Aug. 16. 1780. (M)
Louisa Truxo, a Negress	175	Tucomea, S. America	Living Oct. 5. 1780. (N)
Margaret Patten	138	Lockneugh near Paisley	Lynche's Guide to Health.
Janet Taylor	108	Fintray, Scotland	Died Oct. 10. 1780.
Richard Lloyd	133	Montgomery	Lynche's Guide to Health.
Susannah Hilliar	100	Piddington, Northampsh.	Died Feb. 19. 1781. (O)
Ann Cockbolt	105	Stoke-Bruerne, *Ib.*	—— April 5. 1775. (P)
James Hayley	112	Middlewich, Cheshire	—— March 17. 1781. (Q)

William Walker, aged 112, not mentioned above, who was a soldier at the battle of Edgehill.

If we look back to an early period of the Christian era, we shall find that Italy has been, at least about that time, peculiarly propitious to longevity. Lord Bacon observes that the year of our Lord 76, in the reign of Vespasian, was memorable; for in that year was a taxing which afforded the most authentic method of knowing the ages of men. From it there was found in that part of Italy lying between the Apennine mountains and the river Po, 124 persons who either equalled or exceeded 100 years of age, namely—

	54	persons of	100 years each.
	57	-	110
	2	-	125
	4	-	130
	4	-	136
	3	-	140
In Parma	3	-	120
	2	-	130
In Brussels	1	-	125
In Placentia	1	-	131

In

(A) Fuller's Worthies, p. 140.
(B) Phil. Trans. abridged by Lowthorp, vol. iii. p, 30. 6.
(C) Derham's Physico-Theology, p. 173.
(D) Annual Register.
(E) Daily Advertiser, Nov. 18. 1777.
(F) Warwickshire.
(G) Daily Advertiser, March 1774.
(H) Morning Post, Feb. 29. 1776.
(I) Daily Advertiser, June 24. 1776.
(K) Daily Advertiser, Aug. 22. 1776.
(L) See Inscription in the portico of All-Saints church.
(M) London Even. Post, Aug. 22. 1780.
(N) London Chronicle, Oct. 5. 1780.
(O) Northamp. Mercury, Feb. 19. 1781.
(P) Well known to persons of credit in Northampton.
(Q) Gen. Evening Post, March 24. 1781.

Longevity.

In Faventia	1 person of	132 years.	
	6	-	110
	4	-	120
In Rimino	1	-	150 years, viz. Marcus Aponius.

Mr Carew, in his Survey of Cornwall, assures us, that it is no unusual thing with the inhabitants of that county to reach 90 years of age and upwards, and even to retain their strength of body and perfect use of their senses. Besides Brown, the Cornish beggar, who lived to 120, and one Polezew to 130 years of age, he remembered the decease of four persons in his own parish, the sum of whose years, taken collectively, amounted to 340. Now, although longevity evidently prevails more in certain districts than in others, yet it is by no means confined to any particular nation or climate; nor are there wanting instances of it in almost every quarter of the globe, as appears from the preceding as well as the subsequent Table; which might have been considerably enlarged, had it appeared necessary; but we have only added, in the last, three recent instances that are peculiarly remarkable. Longevity.

Names of the Persons.	Age.	Places of Abode.	Where recorded.
Hippocrates, Physician	104	Island of Cos	Lynche on Health, chap. 3.
Democritus, Philosopher	109	Abdera	Bacon's History, 1095.
Galen, Physician	140	Pergamus	Voss. Inst. lib. iii.
Albuna, Marc	150	Ethiopia	Hakewell's Ap. lib. i.
Dumitur Raduly	140	Haromszeck, Transylvania	Died Jan. 18. 1782. General Gazetteer, April 18.
Titus Fullonius	150	Bononia	Fulgosus, lib. viii.
Abraham Paiba	142	Charlestown, South Carol.	General Gazetteer.
L. Tertulla	137	Ariminum	Fulgosus, lib. viii.
Lewis Cornaro	100	Venice	Bacon's Hist. of Life, p. 134.
Robert Blackeney, Esq.	114	Armagh, Ireland	General Gazetteer.
Margaret Scott	125	Dalkeith, Scotland	Inscription on her tomb there.
W. Gulstone	140	Ireland	Fuller's Worthies.
J. Bright	105	Ludlow	Lynche on Health.
William Postell	120	France	Bacon's History, p. 134.
Jane Reeves	103	Essex	St James's Chron. June 14. 1781.
W. Paulet, Marquis of Winchester	106	Hampshire	Baker's Chron. p. 502.
John Wilson	116	Suffolk	Gen. Gaz. Oct. 29. 1782.
Patrick Wian	115	Lesbury, Northumberland	Plemp. Fundam. Med. § 4. c. 8.
M. Laurence	140	Orcades	Buchanan's Hist. of Scotland.
Evan Williams	145	Cacrmarthen workhouse, still alive	General Gazetteer, Oct. 12th 1782.
John Jacobs (R)	121	Mount Jura	All the public prints, Jan. 1790.
Matthew Tait (S)	123	Auchinleck, Ayrshire	Died Feb. 19. 1792. Edin. Even. Cour. Mar. 8. 1792.
Donald Macleod (T)	104	Isle of Sky. Alive Jan. 1792.	All the public prints at the end of 1790; and *Memoirs*, &c.

(R) This man, in 1789, at the age of 120, quitted his native hills, and from the summit of Mount Jura undertook a journey to Versailles, to behold and return thanks to the national assembly for the vote which had freed him and his poor countrymen from the feudal yoke. In the early part of his life, he was a servant in the family of the prince de Beaufremont. His memory continued good to the last day of his life; and the principal inconveniences which he felt from his great age were, that his sight was weakened, and the natural heat of his body was so diminished, that he shivered with cold in the middle of the dog-days if he was not sitting by a good fire. This old man was received in the body of the house by the national assembly, indulged with a chair, and directed to keep on his hat lest he should catch cold if he was to sit uncovered. A collection was made for him by the members, which exceeded 500l. sterling; but he lived not to return to Mount Jura. He was buried on Saturday the 31st of January 1790, with great funeral pomp, in the parish-church of St Eustace at Paris.

(S) He served as a private at the taking of Gibraltar in 1704.

(T) *Memoirs of the Life and gallant Exploits of the Old Highlander, Serjeant Donald Macleod*, &c. published 1791, in the 103d year of his age.—This old gentleman, for it appears that he really is a gentleman both by birth and by behaviour, was born in the year of the Revolution, in the parish of Bracadill, in the isle of Sky, and county of Inverness, North Britain. He is a cadet of the family of Ulinish in Sky; and descended, through his mother, from Macdonald of Slate, the ancestor of the present Lord Macdonald. The earlier part of his life coincided with the famine of seven years in Scotland; which was so great as to suggest, even

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Longevity. A certain author mentions a list collected by himself of 107 persons, who all died at the age of 120 and upwards. Two of them attained the age of 150, three of 152, one of 154, one of 169, and another of 175. In 1763 there were found in Sweden 988 females above 90 years of age. We have seen a list of 104 persons, none of whom died under 120 years of age, and one of them, it is said, lived to the prodigious age of 180. Forty-one of them belonged to England, 16 to Scotland, and 24 to Ireland.

The antediluvians are purposely omitted, as bearing too little reference to the present race of mortals, to afford any satisfactory conclusions; and as they have been already taken notice of in a separate article; see ANTEDILUVIANS). As the improbable stories of some persons who have almost rivalled them in modern times, border too much upon the marvellous to find a place in these tables, the present examples are abundantly sufficient to prove, that longevity does not depend, so much as has been supposed, on any particular climate, situation, or occupation in life: for we see, that it often prevails in places where all these are extremely dissimilar; and it would, moreover, be very difficult, in the histories of the several persons above mentioned, to find any circumstance common to them all, except, perhaps, that of being born of healthy parents, and of being inured to daily labour, temperance, and simplicity of diet. Among the inferior ranks of mankind, therefore, rather than among the sons of ease and luxury, shall we find the most numerous instances of longevity; even frequently, when other external circumstances seem extremely unfavourable; as in the case of the poor sexton at Peterborough, who, notwithstanding his unpromising occupation among dead bodies, lived long enough to bury two crowned heads, and to survive two complete generations. The livelihood of Henry Jenkins and old Parre is said to have consisted chiefly of the coarsest fare, as they depended on precarious alms. To which may be added the remarkable instance of Agnes Milbourne, who, after bringing forth a numerous offspring, and being obliged, through extreme indigence, to pass the latter part of her life in St Luke's workhouse, yet reached her 106th year in that sordid and unfriendly situation. The plain diet and invigorating employments of a country life are acknowledged on all hands to be highly conducive to health and longevity, while the luxuries and refinements of large cities are allowed to be equally destructive to the human species; and this consideration alone, perhaps, more than counterbalances all the boasted privileges of superior elegance and civilization resulting from a city life. Longevity.

From country villages, and not from crowded cities, have the preceding instances of longevity been chiefly supplied. Accordingly it appears from the London bills of mortality, during a period of 30 years, viz. from the year 1728 to 1758, the sum of the deaths amounted to 750,322, and that in all this prodigious number, only 242 persons survived the 100th year of their age! This overgrown metropolis is computed by Dr Price to contain a ninth part of the inhabitants of England, and to consume annually 7000 persons, who remove into it from the country every year, without increasing it. He moreover observes, that the number of inhabitants in England and Wales has diminished about one-fourth part since the Revolution; and so rapidly of late, that in 11 years, near 200,000 of our common people have been lost. If the calculation be just, however alarming it may appear in a national view, there is this consolation, when considered in a philosophical light, that without partial evil, there can be no general good; and

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to the patriotic Mr Fletcher, the idea of the people selling themselves as slaves for immediate subsistence. He was bred in the midst of want and hardships, cold, hunger, and for the years of his apprenticeship with a mason and stone-cutter in Inverness, in incessant fatigue. He inlisted, when a boy, in the Scottish service, in the town of Perth in the last year of the reign of King William. The regiment into which he inlisted was the Scots Royals, commanded by the earl of Orkney. That old military corps, at that time, used bows and arrows as well as swords, and wore steel caps. He served in Germany and Flanders under the duke of Marlborough; under the duke of Argyle, in the rebellion 1715; in the Highland Watch, or companies raised for enforcing the laws in the Highlands; in the same companies when, under the name of the 42d regiment, they were sent abroad to Flanders, to join the army under the duke of Cumberland; in the same regiment in Ireland, and on the breaking out of the French war, 1757, in America. From the 42d he was draughted to act as a drill serjeant in the 78th regiment, in which he served at the reduction of Louisburg and Quebec: After this he became an out-pensioner of Chelsea Hospital. But such was the spirit of this brave and hardy veteran, that he served in 1761 as a volunteer in Germany under the marquis of Granby; and offered his services in the American war to Sir Henry Clinton; who, though he declined to employ the old man in the fatigues and dangers of war, treated him with great kindness, allowed him a liberal weekly pension out of his own pocket, and sent him home in a ship charged with despatches to government.—The serjeant, "as his memory, according to the observation of his biographer, is impaired, does not pretend to make an exact enumeration of all his offspring: but he knows of 16 sons now living, 14 of whom are in the army and navy, besides daughters; the eldest of whom by his present wife is a mantuamaker at Newcastle.—His eldest son is now 83 years old, and the youngest only nine. Nor, in all probability, would this lad close the rear of his immediate progeny, if his present wife, the boy's mother, had not attained to the 49th year of her age."—In his prime, he did not exceed five feet and seven inches. He is now inclined through age to five feet five inches. He has an interesting physiognomy, expressive of sincerity, sensibility, and manly courage. His biographer very properly submits it to the consideration of the Polygraphic Society, whether they might not do a thing worthy of themselves and their ingenious art, if they should multiply likenesses of this living antiquity, and circulate them at an easy rate throughout Britain and Europe. They would thus gratify a very general curiosity; a curiosity not confined to the present age.

Longevity. and that what a nation loses in the scale of population at one period, it gains at another; and thus, probably, the average number of inhabitants on the surface of the globe continues at all times nearly the same. By this medium, the world is neither overstocked with inhabitants nor kept too thin, but life and death keep a tolerably equal pace. The inhabitants of this island, comparatively speaking, are but as the dust in the balance; yet instead of being diminished, we are assured by other writers, that within these 30 years they are greatly increased.

The desire of self-preservation, and of protracting the short span of life, is so intimately interwoven with our constitution, that it is justly esteemed one of the first principles of our nature, and, in spite even of pain and misery, seldom quits us to the last moments of our existence. It seems, therefore, to be no less our duty than our interest, to examine minutely into the various means that have been considered as conducive to health and long life: and, if possible, to distinguish such circumstances as are essential to that great end from those which are merely accidental. But here it is much to be regretted, that an accurate history of the lives of all the remarkable persons in the above table, so far as relates to the diet, regimen, and the use of the non-naturals, has not been faithfully handed down to us; without which it is impossible to draw the necessary inferences. Is it not then a matter of astonishment, that historians and philosophers have hitherto paid so little attention to longevity? If the present imperfect list should excite others, of more leisure and better abilities, to undertake a full investigation of so interesting a subject, the inquiry might prove not only curious but highly useful to mankind. In order to furnish materials for a future history of longevity, the bills of mortality throughout the kingdom ought first to be revised, and put on a better footing, agreeable to the scheme of which Manchester and Chester have already given a specimen highly worthy of our imitation. The plan, however, might be farther improved with very little trouble, by adding a particular account of the diet and regimen of every person who dies at 80 years of age or upwards; and mentioning whether his parents were healthy, long-lived people, &c. An accurate register, thus established throughout the British dominions, would be productive of many important advantages to society, not only in a medical and philosophical, but also in a political and moral view.

All the circumstances which are most essentially necessary to life, may be comprised under the six following heads: 1. Air and climate; 2. Meat and drink; 3. Motion and rest; 4. The secretions and excretions; 5. Sleep and watching; 6. Affections of the mind.

These, though all perfectly natural to the constitution, have by writers been styled the non-naturals, by a strange perversion of language; and have been all copiously handled under that improper term. However, it may not be amiss to offer a few short observations on each, as they are so immediately connected with the present subject.

1. *Air*, &c. It has long been known that fresh air is more immediately necessary to life than food; for a man may live two or three days without the latter, but not many minutes without the former. The vivifying principle contained in the atmosphere, so essential to the support of flame, as well as animal life, concerning which authors have proposed so many conjectures, appears now to be nothing else but that pure dephlogisticated fluid lately discovered by that ingenious philosopher Dr Priestley. The common atmosphere may well be supposed to be more or less healthy in proportion as it abounds with this animating principle. As this exhales in copious streams from the green leaves of all kinds of vegetables, even from those of the most poisonous kinds, may we not, in some measure account why instances of longevity are so much more frequent in the country than in large cities; where the air, instead of partaking so largely of this salutary impregnation, is daily contaminated with noxious animal effluvia and phlogiston? Longevity.

With respect to climate, various observations conspire to prove, that those regions which lie within the temperate zones are best calculated to promote long life. Hence, perhaps, may be explained, why Italy has produced so many long livers, and why islands in general are more salutary than continents; of which Bermudas and some others afford examples. And it is a pleasing circumstance that our own island appears from the above table (notwithstanding the sudden vicissitudes to which it is liable) to contain far more instances of longevity than could well be imagined. The ingenious Mr Whitehurst assures us, from certain facts, that Englishmen are in general longer lived than North Americans; and that a British constitution will last longer, even in that climate, than a native one. But it must be allowed in general, that the human constitution is adapted to the peculiar state and temperature of each respective climate, so that no part of the habitable globe can be pronounced too hot or too cold for its inhabitants. Yet, in order to promote a friendly intercourse between the most remote regions, the Author of nature has wisely enabled the inhabitants to endure great and surprising changes of temperature with impunity.

2. *Foods and drink.* Though foods and drink of the most simple kinds are allowed to be the best calculated for supporting the body in health, yet it can hardly be doubted but variety may be safely indulged occasionally, provided men would restrain their appetites within the bounds of temperance: for bountiful Nature cannot be supposed to have poured forth such a rich profusion of provisions, merely to tantalize the human species, without attributing to her the part of a cruel stepdame, instead of that of the kind and indulgent parent. Besides, we find, that by the wonderful powers of the digestive organs, a variety of animal and vegetable substances, of very discordant principles, are happily assimilated into one bland homogeneous chyle; therefore it seems natural to distrust those cynical writers, who would rigidly confine mankind to one simple dish, and their drink to the mere water of the brook. Nature, it is true, has pointed out that mild insipid fluid as the universal diluent, and therefore most admirably adapted for our daily beverage. But experience has equally proved, that vinous and spirituous liquors, on certain occasions, are no less salutary and beneficial, whether it be to support strength against sickness or bodily fatigue, or to exhilarate the mind under the pressure of heavy misfortunes. But, alas!

Longevity. what Nature meant for innocent and useful cordials, to be used only occasionally, custom and caprice have by degrees rendered habitual to the human frame, and liable to the most enormous and destructive abuses. Hence it may be justly doubted, whether gluttony and intemperance have not depopulated the world more than even the sword, pestilence, and famine. True, therefore, is the old maxim, "*Modus utendi ex veneno facit medicamentum, ex medicamento venenum.* See DIETETICS, SUPPLEMENT.

3. and 4. *Motion and rest, sleep and watching.* It is allowed on all hands, that alternate motion and rest, and sleep and watching, are necessary conditions to health and longevity; and that they ought to be adapted to age, temperament, constitution, temperature of the climate, &c.; but the errors which mankind daily commit in these respects become a fruitful source of diseases. While some are bloated and relaxed with ease and indolence, others are emaciated, and become rigid through hard labour, watching, and fatigue.

5. *Secretions and excretions.* Where the animal functions are duly performed, the secretions go on regularly; and the different evacuations so exactly correspond to the quantity of aliment taken in, in a given time, that the body is found to return daily to nearly the same weight. If any particular evacuation happen to be preternaturally diminished, some other evacuation is proportionally augmented, and the equilibrium is commonly preserved; but continued irregularities, in these important functions, cannot but terminate in disease.

6. *Affections of the mind.* The due regulation of the passions, perhaps, contributes more to health and longevity than that of any other of the non-naturals. The animating passions, such as joy, hope, love, &c. when kept within proper bounds, gently excite the nervous influence, promote an equable circulation, and are highly conducive to health; while the depressing affections, such as fear, grief, and despair, produce the contrary effect, and lay the foundation of the most formidable diseases.

From the light which history affords us, as well as from some instances in the above table, there is great reason to believe, that longevity is in a great measure hereditary; and that healthy long-lived parents would commonly transmit the same to their children, were it not for the frequent errors in the non-naturals, which so evidently tend to the abbreviation of human life.

Where is it, but from these causes, and the unnatural modes of living, that, of all the children which are born in the capital cities of Europe, nearly one half die in early infancy? To what else can we attribute this extraordinary mortality? Such an amazing proportion of premature deaths is a circumstance unheard of among savage nations, or among the young of other animals! In the earliest ages, we are informed, that human life was protracted to a very extraordinary length; yet how few persons, in these latter times, arrive at that period which nature seems to have designed! Man is by nature a field animal, and seems destined to rise with the sun, and to spend a large portion of his time in the open air, to inure his body to robust exercises and the inclemency of the seasons, and to make a plain homely repast only when hunger dictates. But art has studiously defeated the kind intentions of nature; and by enslaving him to all the blandishments of sense, has left him, alas! an easy victim to folly and caprice. To enumerate the various abuses which take place from the earliest infancy, and which are continued through the succeeding stages of modish life, would carry us far beyond our present intention. Suffice it to observe, that they prevail more particularly among people who are the most highly polished and refined. To compare their artificial mode of life with that of nature, or even of the long-livers in the list, would probably afford a very striking contrast; and at the same time supply an additional reason why, in the very large cities, instances of longevity are so very rare. Longevity || Long-Island.

LONGFORD, a county of Ireland, in the province of Leinster, bounded by the counties of Leitrim and Cavan on the north, Meath on the east and south, and Roscommon on the west. It contains 143,700 Irish plantation acres, 24 parishes, and above 50,000 inhabitants; and returns two members to the imperial parliament. It is small, and much encumbered with bog, intermixed with a tolerable good soil; and is about 25 miles long, and 24 broad. See LONGFORD, SUPPLEMENT.

LONGFORD, a town of Ireland, situated on the river Cromlin, in the county of Longford and province of Leinster, 64 miles from Dublin; which river falls a few miles below this place into the Shannon. It is a borough, post, market, and fair town; and formerly returned two members to parliament. Patron Lord Longford. It gave title of *earl* to the family of Aungier; of *viscount*, to the family of Mickletlwaite; and now gives that of *baron* to the family of Packenham. Within a mile and a half of the town is a charter-school for above 40 children. This place has a barrack for a troop of horse. It is large and well built; and in a very early age an abbey was founded here, of which St Idus, one of St Patrick's disciples, was abbot. In the year 1400, a fine monastery was founded to the honour of the virgin Mary, for Dominican friars, by O'Ferral prince of Annaly. This monastery being destroyed by fire, Pope Martin V. by a bull in the year 1429, granted an indulgence to all who should contribute to the rebuilding of it. In 1433, Pope Eugene IV. granted a bull to the same purpose; and in 1438 he granted another to the like effect. The church of this friary, now the parish church, is in the diocese of Ardagh. The fairs are four in the year.

LONG-ISLAND, an island of North America, belonging to the state of New York, which is separated from the continent by a narrow channel. It extends from the city of New York east 140 miles, terminating with Montauk point; and is not more than ten miles in breadth on a medium. It is divided into three counties, King's, Queen's, and Suffolk. The south side of the island is flat land, of a light, sandy soil, bordered on the sea-coast with large tracts of salt meadow, extending from the west point of the island to Southampton. This soil, however, is well calculated for raising grain, especially Indian corn. The north side of the island is hilly, and of a strong soil, adapted to the culture of grain, hay, and fruit. A ridge of hills extends from Jamaica to South-hold. Large herds of cattle feed upon Hampstead plain and on the salt marshes upon the south side of the island. Hampstead plain in Queen's county is a curiosity. It

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Long-Island || Longinus.

is 16 miles in length, east and west, and 7 or 8 miles wide. The soil is black and to appearance rich, and yet it was never known to have any natural growth, but a kind of wild grass and a few shrubs. It is frequented by vast numbers of plover. Rye grows tolerably well on some parts of the plain. The most of it lies common for cattle, horses, and sheep. As there is nothing to impede the prospect in the whole length of this plain, it has a curious but tiresome effect upon the eye, not unlike that of the ocean. The island contained 48,752 inhabitants in 1810.

LONGIMETRY, the art of measuring lengths, both accessible and inaccessible. See GEOMETRY and TRIGONOMETRY.

LONGING, a preternatural appetite in pregnant women, and in some sick persons when about to recover. It is called *pica*, from the bird of that name, which is said to be subject to the same disorder. The disorder consists of both a desire of unusual things to eat and drink, and in being soon tired of one and wanting another. It is called *malacia*, from μαλακος, "weakness." In pregnant women it is somewhat relieved by bleeding, and in about the fourth month of their pregnancy it leaves them. Chlorotic girls, and men who labour under suppressed hemorrhoids, are very subject to this complaint, and are relieved by promoting the respective evacuations. In general, whether this disorder is observed in pregnant women, in persons recovering from an acute fever, or those who labour under obsructions of the natural evacuations, this craving of the appetite should be indulged.

LONGINICO, a town of Turkey in Europe, in the Morea, anciently called *Olympia*, famous for being the place where the Olympic games were celebrated, and for the temple of Jupiter Olympus, about a mile distant. It is now but a small place, situated on the river Alpheus, 10 miles from its mouth, and 50 south of Lepanto. E. Long. 22. 0. N. Lat. 37. 30.

LONGINUS, DIONYSIUS, a celebrated Greek critic of the third century, was probably an Athenian. His father's name is unknown, but by his mother he was allied to the celebrated Plutarch. His youth was spent in travelling with his parents, which gave him an opportunity to increase his knowledge, and improve his mind. After his travels, he fixed his residence at Athens, and with the greatest assiduity applied to study. Here he published his Treatise on the Sublime; which raised his reputation to such a height, and gave the Athenians such an opinion of his judgment and taste, that they made him sovereign judge of all authors, and every thing was received and rejected by the public according to his decisions. He seems to have staid at Athens a long time; here he taught the academic philosophy, and among others had the famous Porphyry for his pupil. But it was at length his fortune to be drawn from Athens, and to mix in more active scenes; to train up young princes to virtue and glory; to guide the busy passions of the great to noble objects; to struggle for, and at last to die in the cause of liberty. Zenobia, queen of the East, prevailed on him to undertake the education of her sons; and he soon gained an uncommon share in her esteem: she spent the vacant hours of her life in his conversation, and modelled her sentiments and conduct by his instructions. That princess was at war with Aurelian; and being defeated by him near Antioch, was compelled to shut herself up in Palmyra, her capital city. The emperor wrote her a letter, in which he ordered her to surrender; to which she returned an answer, drawn up by Longinus, which filled him with resentment. The emperor laid siege to the city; and the Palmyrians were at length obliged to open their gates and receive the conqueror. The queen and Longinus endeavoured to fly into Persia; but were unhappily overtaken and made prisoners when they were on the point of crossing the Euphrates. The queen, intimidated, weakly laid the blame of vindicating the liberty of her country on its true author; and the brave Longinus, to the disgrace of the conqueror, was carried away to immediate execution. The writings of Longinus were numerous, some on philosophical, but the greater part on critical subjects. Dr Pearce has collected the titles of 25 treatises, none of which, excepting that on the Sublime, have escaped the depredations of time and barbarians. On this imperfect piece the great fame of Longinus is raised, who, as Pope expresses it—"is himself the great sublime he draws." The best edition of his works is that by Tollius, printed at Utrecht in 1694, *cum notis variorum*. It has been translated into English by Mr Smith.

Longinus || Longitude.

LONGISSIMUS DORSI. See ANATOMY, *Table of the Muscles*.

LONGITUDE, in *Geography* and *Navigation*, is the distance of any place from another eastward or westward, counted in degrees upon the equator: but when the distance is reckoned by leagues or miles and not in degrees, or in degrees on the meridian, and not of the parallel of latitude, in which case it includes both latitude and longitude, it is called *departure*.

To find the longitude at sea, is a problem to which the attention of navigators and mathematicians has been drawn ever since navigation began to be improved.—The importance of this problem soon became so well known, that, in 1598, Philip III. of Spain offered a reward of 1000 crowns for the solution; and his example was soon followed by the States General, who offered 10,000 florins. In 1714 an act was passed in the British parliament, empowering certain commissioners to make out a bill for a sum not exceeding 2000l. for defraying the necessary expences of experiments for ascertaining this point; and likewise granting a reward to the person who made any progress in the solution, proportionable to the degree of accuracy with which the solution was performed: 10,000l. was granted if the longitude should be determined to one degree of a great circle, or 60 geographical miles; 15,000l. if to two-thirds of that distance; and 20,000l. if to half the distance.

In consequence of these proffered rewards, innumerable attempts were made to discover this important secret. The first was that of John Morin professor of mathematics at Paris, who proposed it to Cardinal Richelieu: and though it was judged insufficient on account of the imperfection of the lunar tables, a pension of 2000 livres per annum was procured for him in 1645 by Cardinal Mazarine. Gemma Frisius had indeed, in 1530, projected a method of finding the longitude by means of watches, which at that time were newly invented: but the structure of these machines was then by far too imperfect to admit of any attempt; nor even in

Longitude. in 1631, when Metius made an attempt to this purpose, were they advanced in any considerable degree. About the year 1664, Dr Hooke and Mr Huygens made a very great improvement in watchmaking, by the application of the pendulum spring. Dr Hooke having quarrelled with the ministry, no experiment was made with any of his machines; but many were made with those of Mr Huygens. One experiment particularly, made by Major Holmes, in a voyage from the coast of Guinea in 1665, answered so well, that Mr Huygens was encouraged to improve the structure of his watches: but it was found that the variations of heat and cold produced such alterations in the rate of going of the watch, that unless this could be remedied, the watches could be of little use in determining the longitude.

In 1714 Henry Sully, an Englishman, printed a small tract at Vienna upon the subject of watchmaking. Having afterwards removed to Paris, he applied himself to the improvement of time-keepers for the discovery of the longitude. He taught the famous Julian de Roy: and this gentleman, with his son, and M. Berthoud, are the only persons who, since the days of Sully, have turned their thoughts this way. But though experiments have been made at sea with some of their watches, it does not appear that they have been able to accomplish any thing of importance with regard to the main point. The first who succeeded in any considerable degree was Mr John Harrison; who, in 1726, produced a watch which went so exactly, that for ten years together it did not err above one second in a month. In 1736 it was tried in a voyage to Lisbon and back again, on board one of his majesty's ships; during which it corrected an error of a degree and a half in the computation of the ship's reckoning. In consequence of this he received public encouragement to go on: and by the year 1761 had finished three time-keepers, each of them more accurate than the former. The last turned out so much to his satisfaction, that he now applied to the commissioners of longitude for leave to make an experiment with his watch in a voyage to the West Indies. Permission being granted, his son Mr William Harrison set out in his majesty's ship the Deptford for Jamaica in the month of November 1761. This trial was attended with all imaginable success. The longitude of the island, as determined by the time-keeper, differed from that found by astronomical observations only one minute and a quarter of the equator; the longitudes of places seen by the way being also determined with great exactness. On the ship's return to England, it was found to have erred no more during the whole voyage than $1' 54\frac{1}{2}''$ in time, which is little more than 28 miles in distance; which being within the limits prescribed by the act, the inventor claimed the whole 20,000l. offered by government. Objections to this, however, were soon started. Doubts were pretended about the real longitude of Jamaica, as well as the manner in which the time had been found both there and at Portsmouth. It was alleged also, that although the time-keeper happened to be right at Jamaica, and after its return to England, this was by no means a proof that it had always been so in the intermediate times; in consequence of which allegations, another trial was appointed in a voyage to Barbadoes. Precautions were now taken to obviate as many of these objections as possible. The commissioners sent out proper persons to make astronomical observations at that island: which, when compared with others in England, would ascertain beyond a doubt its true situation. In 1764 then, Mr Harrison junior set sail for Barbadoes; and the result of the experiment was, that the difference of longitude betwixt Portsmouth and Barbadoes was shown by the time-keeper to be 3h. 55′ 3″; and by astronomical observations to be 3h. 54′ 20″, the error being now only 43″ of time, or 10′ 45″ of longitude. In consequence of this and the former trials, Mr Harrison received one half of the reward promised, upon making a discovery of the principles upon which his time-keeper was constructed. He was likewise promised the other half of the reward as soon as time-keepers should be constructed by other artists which should answer the purpose as well as those of Mr Harrison himself. At this time he delivered up all his time-keepers, the last of which was sent to Greenwich to be tried by Mr Nevil Maskelyne, the astronomer-royal. On trial, however, it was found to go with much less regularity than had been expected; but Mr Harrison attributed this to his having made some experiments with it which he had not time to finish when he was ordered to deliver up the watch. Soon after this, an agreement was made by the commissioners with Mr Kendall to construct a watch upon Mr Harrison's principles; and this upon trial was found to answer the purpose even better than any that Harrison himself had constructed. This watch was sent out with Captain Cook in 1772; and during all the time of his voyage round the world in 1772, 1773, 1774, and 1775, never erred quite $14\frac{1}{2}$ seconds per day: in consequence of which, the house of commons, in 1774, ordered the other 10,000l. to be paid to Mr Harrison. Still greater accuracy, however, has been attained. A watch was lately constructed by Mr Arnold, which, during a trial of 13 months, from February 1779 to February 1780, varied no more than 6.69″ during any two days; and the greatest difference between its rates of going on any day and the next to it was 4.11″. The greatest error it would have committed therefore in the longitude during any single day would have been very little more than one minute of longitude; and thus might the longitude be determined with as great exactness as the latitude generally can.—This watch, however, has not yet been tried at sea.

Thus the method of constructing time-keepers for discovering the longitude seems to be brought to as great a degree of perfection as can well be expected. Still, however, as these watches are subject to accidents, and may thus alter the rate of their going without any possibility of a discovery, it is necessary that some other method should be fallen upon, in order to correct from time to time those errors which may arise either from the natural going of the watch, or from any accident which may happen to it. Methods of this kind are all founded upon celestial observations of some kind or other; and for these methods, or even for an improvement in time-keepers, rewards are still held out by government. After the discoveries made by Mr Harrison, the act concerning the longitude was repealed, excepting so much of it as related to the constructing, printing, publishing, &c. of nautical almanacks and other useful tables. It was enacted also, that

Longitude. that any person who shall discover a method for finding the longitude by means of a time-keeper, the principles of which have not hitherto been made public, shall be entitled to a reward of 5000l. if, after certain trials made by the commissioners, the said method shall enable a ship to keep her longitude, during a voyage of six months, within 60 geographical miles, or a degree of a great circle. If the ship keeps her longitude within 40 geographical miles for that time, the inventor is entitled to a reward of 7500l. and to 10,000l. if the longitude is kept within half a degree. If the method is by improved astronomical tables, the author is entitled to 5000l. when they show the distance of the moon from the sun and stars within 15 seconds of a degree, answering to about 7 minutes of longitude, after allowing half a degree for errors of observation and under certain restrictions, and after comparison with astronomical observations for a period of 18½ years, during which the lunar irregularities are supposed to be completed. The same rewards are offered to the person who shall with the like accuracy discover any other method of finding the longitude.

These methods require celestial observations; and any of the phenomena, such as the different apparent places of stars with regard to the moon, the beginning and ending of eclipses, &c. will answer the purpose: only it is absolutely necessary that some variation should be perceptible in the phenomenon in the space of two minutes; for even this short space of time will produce an error of 40 miles in longitude. The most proper phenomena therefore for determining the longitude in this manner are the eclipses of Jupiter's satellites. Tables of their motions have been constructed, and carefully corrected from time to time, as the mutual attractions of these bodies are found greatly to disturb the regularity of their motions. The difficulty here, however, is to observe these eclipses at sea; and this difficulty has been found so great, that no person seems able to surmount it. The difficulty arises from the violent agitation of a ship in the ocean, for which no adequate remedy has ever yet been found, nor probably will ever be found. Mr Christopher Irwin indeed invented a machine which he called a *marine chair*, with a view to prevent the effects of this agitation; but on trying it in a voyage to Barbadoes, it was found to be totally useless.

A whimsical method of finding the longitude was proposed by Messrs Whiston and Ditton from the report and flash of great guns. The motion of sound is known to be nearly equable, from whatever body it proceeds or whatever be the medium. Supposing therefore a mortar to be fired at any place the longitude of which is known, the difference between the moment that the flash is seen and the report heard will give the distances between the two places; whence, if we know the latitudes of these places, their longitudes must also be known. If the exact time of the explosion be known at the place where it happens, the difference of time at the place where it is heard will likewise give the difference of longitude. Let us next suppose the mortar to be loaded with an iron shell filled with combustible matter, and fired perpendicularly upward into the air, the shell will be carried to the height of a mile, and will be seen at the distance of near 100; whence, supposing neither the flash of the mortar should be seen nor the report heard, still the longitude might be determined by the altitude of the shell above the horizon. Longitude.

According to this plan, mortars were to be fired at certain times and at proper stations along all frequented coasts for the direction of mariners. This indeed might be of use, and in stormy weather might be a kind of improvement in lighthouses, or a proper addition to them; but with regard to the determination of longitudes, is evidently ridiculous.

We shall now proceed to give some practical directions for finding the longitude at sea by proper celestial observations; exclusive of those from Jupiter's satellites, which, for reasons just mentioned, cannot be practised at sea. In the first place, however, it will be necessary to point out some of those difficulties which stand in the way, and which render even this method of finding the longitude precarious and uncertain. These lie principally in the reduction of the observations of the heavenly bodies made on the surface of the earth to similar observations supposed to be made at the centre; which is the only place where the celestial bodies appear in their proper situation. It is also very difficult to make proper allowances for the refraction of the atmosphere, by which all objects appear higher than they really are; and another difficulty arises from their parallaxes, which make them, particularly the moon, appear lower than they would otherwise do, excepting when they are in the very zenith. It is also well known, that the nearer the horizon any celestial body is, the greater its parallax will be; and as the parallax and refraction act in opposite ways to one another, the former depressing and the latter raising the object, it is plain, that great difficulties must arise from this circumstance. The sun, for instance, whose parallax is less than the refraction, must always appear higher than he really is; but the moon, whose parallax is greater than her refraction, must always appear lower.

To render observations of the celestial bodies more easy, the commissioners of longitude have caused an Ephemeris or Nautical Almanack to be published annually, containing every requisite for solving this important problem which can be put into any form of tables. But whatever may be done in this way, it will be necessary to make the necessary preparations concerning the dip of the horizon, the refraction, semidiameters, parallax, &c. in order to reduce the apparent to the true altitudes and distances; for which we shall subjoin two general rules.

The principal observation for finding the longitude at sea is that of the moon from the sun, or from some remarkable star near the zodiac. To do this, the operator must be furnished with a watch which can be depended upon for keeping time within a minute for six hours; and with a good Hadley's quadrant, or, which is preferable, a sextant: and this last instrument will still be more fit for the purpose if it be furnished with a screw for moving the index gradually; likewise an additional dark glass, but not so dark as the common kind, for taking off the glare of the moon's light in observing her distance from a star. A small telescope, which may magnify three or four times, is also necessary to render the contact of a star with the moon's limb more discernible. A magnifying glass of

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Longitude. one and a half or two inches focus will likewise assist the operator in reading off his observations with the greater facility.

1. *To make the observation.* Having examined and adjusted his instrument as well as possible, the observer is next to proceed in the following manner: If the distance of the moon from the sun is to be observed, turn down one of the screens; look at the moon directly through the transparent part of the horizon-glass; and keeping her in view, gently move the index till the sun's image be brought into the silvered part of that glass. Bring the nearest limbs of both objects into contact, and let the quadrant librate a little on the lunar ray; by which means the sun will appear to rise and fall by the side of the moon; in which motion the nearest limbs must be made to touch one another exactly by moving the index. The observation is then made; and the division coinciding with that on the Vernier scale, will show the distance of the nearest limbs of the objects.

When the distance of the moon from a star is to be observed when the moon is very bright, turn down the lightest screen, or use a dark glass lighter than the screens, and designed for this particular purpose; look at the star directly through the transparent part of the horizon-glass; and keeping it there, move the index till the moon's image is brought into the silvered part of the same glass. Make the quadrant librate gently on the star's ray, and the moon will appear to rise and fall by the star: move the index between the librations, until the moon's enlightened limb is exactly touched by the star, and then the observation is made. In these operations, the plane of the quadrant must always pass through the two objects, the distance of which is to be observed: and for this purpose it must be placed in various positions according to the situation of the objects, which will soon be rendered easy by practice.

The observation being made, somebody at the very instant that the operator calls must observe by the watch the exact hour, minute, and quarter minute, if there be no second hand, in order to find the apparent time; and at the same instant, or as quick as possible, two assistants must take the altitudes of those objects the distance of which is observed; after which the observations necessary for finding the longitude are completed.

The Ephemeris shows the moon's distance from the sun, and likewise from proper stars, to every three hours of apparent time for the meridian of Greenwich; and that the greater number of opportunities of observing this luminary may be given, her distance is generally set down from at least one object on each side of her. Her distance from the sun is set down while it is between 40 and 120 degrees; so that, by means of a sextant, it may be observed for two or three days after her first and before her last quarter. When the moon is between 40 and 90 degrees from the sun, her distance is set down both from the sun and from a star on the contrary side: and, lastly, when the distance is above 120 degrees, the distance is set down from two stars, one on each side of her. The distance of the moon from objects on the east side of her is found in the Ephemeris in the 8th and 9th pages of the month; and her distance from objects on the west is found in the 10th and 11th pages of the month. Longitud

When the Ephemeris is used, the distance of the moon must only be observed from those stars the distance of which is set down there; and these afford a ready means of knowing the star from which her distance ought to be observed. The observer has then nothing more to do than to set his index to the distance roughly computed at the apparent time, estimated nearly for the meridian at Greenwich; after which he is to look to the east or west of the moon, according as the distance of the star is found in the 8th or 9th, or in the 10th or 11th, pages of the month; and having found the moon upon the horizon-glass, the star will easily be found by sweeping with the quadrant to the right or left, provided the air be clear and the star be in the line of the moon's shortest axis produced. The time at Greenwich is estimated by turning into time the supposed longitude from that place, and adding it to the apparent time at the ship, or subtracting it from it as occasion requires. The distance of the moon from the sun, or a star, is roughly found at this time, by saying, As 180 minutes (the number contained in three hours) is to the difference in minutes between this nearly estimated time and the next preceding time set down in the Ephemeris; so is the difference in minutes between the distance in the Ephemeris for the next preceding and next following times, to a number of minutes: which being added to the next preceding distance, or subtracted from it, according as it is increasing or decreasing, will give the distance nearly at the time the observation is to be made, and to which the index must be set.

An easier method of finding the angular distance is by bringing the objects nearly into contact in the common way, and then fixing the index tight to a certain degree and minute; waiting until the objects are nearly in contact, giving notice to the assistants to get ready with the altitudes, and when the objects are exactly in contact to call for the altitudes and the exact time by the watch. The observer may then prepare for taking another distance, by setting his index three or four minutes backwards or forwards, as the objects happen to be receding from or approaching to each other; thus proceeding to take the distance, altitudes, and time by the watch, as before. Thus the observer may take as many distances as he thinks proper; but four at the distance of three minutes, or three at the distance of four minutes, will at all times be sufficient. Thus not only the eye of the observer will be less fatigued, but he will likewise be enabled to manage his instrument with much greater facility in every direction, a vertical one only excepted. If in taking the distances the middle one can be taken at any even division on the arch, such as a degree, or a degree and 20 or 40 minutes, that distance will be independent of the Nonius division, and consequently free of those errors which frequently arise from the inequality of that division in several parts of the graduated arch. The observation ought always to be made about two hours before or after noon; and the true time may be found by the altitude of the sun taken at the precise time of the distance. If three distances are taken,

then

Longitude. then find the time by the altitude corresponding with the middle distance; and thus the observation will be secured from any error arising from the irregularity of the going of the watch. As the time, however, found by the altitude of a star cannot be depended upon, because of the uncertainty of the horizon in the night, the best way of determining the time for a night observation will be by two altitudes of the sun; one taken on the preceding afternoon, before he is within six degrees of the horizon; and the other on the next morning, when he is more than six degrees high. It must bo observed, however, that in order to follow these directions, it is necessary that the atmosphere should be pretty free from clouds; otherwise the observer must take the observations at such times as he can best obtain them.

2. *To reduce the observed Distance of the Sun or a Star from the Moon to the true Distance.* 1. Turn the longitude into time, and add it to the time at the ship if the longitude be west, but subtract it if it be east, which will give the supposed time at Greenwich; and this we may call *reduced time.* 2. Find the nearest noon or midnight both before and after the reduced time in the seventh page of the month in the Ephemeris. 3. Take out the moon's semidiameter and horizontal parallaxes corresponding to these noons and miduights, aud find their differences. Then say, As 12 hours is to the moon's semidiameter in 12 hours, so is the reduced time to a number of seconds; which, either added to or subtracted from the moon's semidiameter at the noon or midnight just mentioned, according as it is increasing or decreasing, will give her apparent semidiameter; to which add the correction from Table VIII. of the Ephemeris, and the sum will be her true semidiameter at the reduced time. And as 12 hours is to the difference of the moon's horizontal parallax in 12 hours, so is the reduced time to a fourth number; which being added to or subtracted from the moon's horizontal parallax at the noon or midnight before the reduced time, according as it is increasing or decreasing, the sum or difference will he the moon's horizontal parallax at the reduced time. 4. If the reduced time be nearly any even part of 12 hours, viz. $\frac{1}{6}$th, $\frac{1}{4}$th, &c. these parts of the difference may be taken, and either added or subtracted according to the directions already given, without being at the trouble of working by the rule of proportion. 5. To the observed altitude of the sun's lower limb add the difference betwixt the semidiameter and dip; and that sum will be his apparent altitude. 6. From the sun's refraction take his parallax in altitude, and the remainder will be the correction of the sun's altitude. 7. From the star's observed altitude take the dip of the horizon, and the remainder will be the apparent altitude. 8. The refraction of a star will be the correction of its altitude. 9. Take the difference between the moon's semidiameter and dip, and add it to the observed altitude if her lower limb was taken, or subtract it if her upper limb was taken; and the sum or difference will be the apparent altitude of her centre. 10. From the proportional logarithm of the moon's horizontal parallax, taken out of the nautical almanack (increasing its index by 10), taking the logarithmic cosine of the moon's apparent altitude, the remainder will be the proportional logarithm of her parallax in altitude; from which take her refraction, and the remainder will be the correction of the moon's altitude. 11. Longitude. To the observed distance of the moon from a star add her semidiameter if the nearest limb be taken, but subtract it if the farthest limb was taken, and the sum or difference will be the apparent distance. 12. To the observed distance of the sun and moon add both their semidiameters, and the sum will be the apparent distance of their centres.

3. *To find the true Distance of the Objects, having their apparent Altitudes and Distances.* 1. To the proportional logarithm of the correction of the sun or star's altitude, add the logarithmic cosine of the sun or star's apparent altitude; the logarithmic sine of the apparent distance of the moon from the sun or star; and the logarithmic cosecant of the moon's apparent altitude. The sum of these, rejecting 30 from the index, will be the proportional logarithm of the first angle. 2. To the proportional logarithm of the correction of the sun or star's altitude, add the logarithmic cotangent of the sun or star's apparent altitude, and the logarithmic tangent of the apparent distance of the moon from the sun or star. The sum of these, rejecting 20 in the index, will be the proportional logarithm of the secoud angle. 3. Take the difference between the first and second angles, adding it to the apparent distance if it be less than 90, and the first angle be greater than the second; but subtracting it if the second be greater than the first. If the distance be greater than 90, the sum of the angles must be added to the apparent distance, which will give the distance corrected for the refraction of the sun or star. 4. To the proportional logarithm of the correction of the moon's altitude add the logarithmic cosine of her apparent altitude; the logarithmic sine of the distance corrected for the sun or star's refractiou and the logarithmic cosecant of the sun's or star's apparent altitude. The sum, rejecting 30 in the index, will be the proportional logarithm of the third augle. 5. To the proportional logarithm of the correction of the moon's apparent altitude, add the logarithmic cotangent of her apparent altitude, and the tangent of the distance corrected for the sun or star's refraction; their sum, rejecting 20 in the index, will be the proportional logarithm of the fourth angle. 6. Take the difference between the third and fourth angles, and subtract it from the distance corrected for the sun or star's refraction if less then 90, and the third angle be greater than the fourth; or add it to the distance if the fourth angle be greater than the third: but if the distance be more than 90, the sum of the angles must be subtracted from it, to give the distance corrected for the sun or star's refraction, and the principal effects of the moon's parallax. 7. In Table XX. of the Ephemeris, look for the distance corrected for the sun and star's refraction, and the moon's parallax in the top column, and the correction of her altitude in the left-hand side column; take out the number of seconds that stand under the former, and opposite to the latter. Look again in the same table for the corrected distance in the top column, and the principal effects of the moon's parallax in the left-hand side column, and take out the number of seconds. The difference between these two

Longitude. numbers must be added to the corrected distance if less than 90, but subtracted from it if greater; and the sum or difference will be the true distance.

4. *To determine the Longitude after having obtained the true Distance.*—Look in the Ephemeris among the distances of the objects for the computed distance betwixt the moon and the other object observed on the given day. If it be found there, the time at Greenwich will be at the top of the column; but if it falls between two distances in the Ephemeris which stand immediately before and after it, and also the difference between the distance standing before and the computed distance; then take the proportional logarithms of the first and second differences, and the difference between these two logarithms will be the proportional logarithm of a number of hours, minutes, and seconds; which being added to the time standing over the first distance, will give the true time at Greenwich. Or it may be found by saying, As the first difference is to three hours, so is the second difference to a proportional part of time: which being added as above directed, will give the time at Greenwich. The difference between Greenwich time and that at the ship, turned into longitude, will be that at the time the observations were made; and will be east if the time at the ship is greatest, but west if it is least.

Having given these general directions, we shall next proceed to show some particular examples of finding the longitude at sea by all the different methods in which it is usually tried.

1. *To find the longitude by Computation from the Ship's Course.*—Were it possible to keep an accurate account of the distance the ship has run, and to measure it exactly by the log * or any other means, then both latitude and longitude would easily be found by settling the ship's account to that time. For the course and distance being known, the difference of latitude and departure is readily found by the Traverse Table: and the difference of longitude being known, the true longitude and latitude will also be known. A variety of causes, however, concur to render this computation inaccurate; particularly the ship's continual deflection from the course set by her playing to the right and left round her centre of gravity: the unequal care of those at the helm, and the distance supposed to be sailed being erroneous, on account of stormy seas, unsteady winds, currents, &c. for which it seems impossible to make any allowance. The place of the ship, however, is judged of by finding the latitude every day, if possible, by observations; and if the latitude found by observation agrees with that by the reckoning, it is presumed that the ship's place is properly determined; but if they disagree, it is concluded that the account of the longitude stands in need of correction, as the latitude by observation is always to be depended upon.

* See Log, *Perpetual.*

Currents very often occasion errors in the computation of a ship's place. The causes of these in the great depths of the ocean are not well known, though many of the motions near the shore can be accounted for. It is supposed that some of those in the great oceans are owing to the tide following the moon, and a certain libration of the waters arising from thence; likewise that the unsettled nature of these currents may be owing to the changes in the moon's declination. In the torrid zone, however, a considerable current is occasioned by the trade winds, the motion being constantly to the west, at the rate of eight or ten miles per day. At the extremities of the trade winds, or near the 30th degree of north or south latitude, the currents are probably compounded of this motion to the westward, and of one towards the equator; whence all ships sailing within these limits ought to allow a course each day for the current. Longitud

When the error is supposed to have been occasioned by a current, it ought if possible to be tried whether the case is so or not; or we must make a reasonable estimate of its drift and course. Then with the setting and drift, as a course and distance, find the difference of latitude and departure; with which the dead reckoning is to be increased or diminished; and if the latitude thus corrected agrees with that by observation, the departure thus corrected may be safely taken as true, and thus the ship's place with regard to the longitude determined.

Exam. Suppose a ship in 24 hours finds, by her dead reckoning, that she has made 96 miles of difference of latitude north and 38 miles of departure west; but by observation finds her difference of latitude 112, and on trial that there is a current which in 24 hours makes a difference of 16 miles latitude north, and 10 miles of departure east: Required the ship's departure.

	Miles.		*Miles.*
Diff. lat. by account	96 N.	Departure by account	38 W.
Diff. lat. by current	16 N.	Departure by current	10
True diff. lat.	112		28 W.

Here the dead reckoning corrected by the current gives the difference of latitude 112 miles, which is the same as that found by observation; whence the departure 28 is taken as the true one.

When the error is supposed to arise from the courses and distances, we must observe, that if the difference of latitude is much more than the departure, or the direct course has been within three points of the meridian, the error is most probably in the distance. But if the departure be much greater than the difference of latitude, or the direct course be within three points of the parallel, or more than five points from the meridian, the error is probably to be ascribed to the course. But if the courses in general are near the middle of the quadrant, the error may be either in the course, or in the distance, or both. This method admits of three cases.

1. When, by the dead reckoning, the difference of latitude is more than once and a half the departure; or when the course is less than three points: Find the course to the difference of latitude and departure. With this course and the meridional difference of latitude by observation, find the difference of longitude.

2. When the dead reckoning is more than once and a half the difference of latitude; or when the course is more than five points: Find the course and distance, with the difference of latitude by observation, and departure by account; then with the co-middle latitude by observation, and departure by account, find the difference of longitude.

Longitude. 3. When the difference of latitude and departure by account is nearly equal, or the direct course is between three and five points of the meridian: Find the course with the difference of latitude and departure by account since the last observation. With this course and the difference of latitude by observation find another departure. Take half the sum of these departures for the true one. With the true departure and difference of latitude by observation find the true course; then with the true course and meridional difference of latitude find the difference of longitude.

2. *To find the Longitude at Sea by a Variation-chart.*—Dr Halley having collected a great number of observations on the variation of the needle in many parts of the world; by that means was enabled to draw certain lines on Mercator's chart, shewing the variation in all the places over which they passed in the year 1700, at which time he first published the chart; whence the longitude of those places might be found by the chart, provided its latitude and variation were given. The rule is, Draw a parallel of latitude on the chart through the latitude found by observation; and the point where it cuts the curved line marked with the variation that was observed will be the ship's place.

Exam. A ship finds by observation the latitude to be 18° 20′ north, and the variation of the compass to be 4° west. Required the ship's place.—Lay a ruler over 18° 20′ north parallel to the equator; and the point where its edge cuts the curve of 4° west variation gives the ship's place, which will be found in about 27° 10′ west from London.

This method of finding the longitude, however, is attended with two inconveniences. 1. That when the variation lines run east or west, or nearly so, it cannot be applied; though as this happens only in certain parts of the world, a variation chart may be of great use for the rest. Even in those places indeed where the variation curves do run east or west, they may be of considerable use in correcting the latitude when meridian observations cannot be had; which frequently happens on the northern coasts of America, the Western ocean, and about Newfoundland; for if the variation can be found exactly, the east and west curve answering to it will show the latitude. But, 2. The variation itself is subject to continual change; whence a chart, though ever so perfect at first, must in time become totally useless; and hence the charts constructed by Dr Halley, though of great utility at their first publication, became at length almost entirely useless. A new one was published in 1746 by Messrs Mountaine and Dodson, which was so well received, that in 1756 they again drew variation lines for that year, and published a third chart the year following. They also presented to the Royal Society a curious paper concerning the variation of the magnetic needle, with a set of tables annexed containing the result of more than 50,000 observations, in six periodical reviews from the year 1700 to 1756 inclusive, adapted to every five degrees of latitude and longitude in the more frequented oceans; all of which were published in the Philosophical Transactions for 1757.

3. *To find the Longitude by the Sun's Declination.*—Having made such observations on the sun as may enable us to find his declination at the place, take the difference between this computed declination and that shown at London by the Ephemeris: from which take also the daily difference of declination at that time; then say, as the daily difference of declination is to the above found difference, so is 360 degrees to the difference of longitude. In this method, however, a small error in the declination will make a great one in the longitude. Longitude.

4. *To find the Longitude by the Moon's culminating.*—Seek in the Ephemeris for the time of her coming to the meridian on the given day and on the day following, and take their difference; also take the difference betwixt the times of culminating on the same day as found in the ephemeris and as observed; then say, as the daily difference in the ephemeris is to the difference between the ephemeris and observation; so is 360 degrees to the difference of longitude. In this method also a small difference in the culmination will occasion a great one in the longitude.

5. *By Eclipses of the Moon.*—This is done much in the same manner as by the eclipses of Jupiter's satellites: For if, in two or more distant places where an eclipse of the moon is visible, we carefully observe the times of the beginning and ending, the number of digits eclipsed, or the time when the shadow touches some remarkable spot, or when it leaves any particular spot on the moon, the difference of the times when the observations were made will give the difference of longitude. Phenomena of this kind, however, occur too seldom to be of much use.

6. In the 76th volume of the Philosophical Transactions, Mr Edward Pigot gives a very particular account of his method of determining the longitude and latitude of York; in which he also recommends the method of determining the longitude of places by observations of the *moon's transit over the meridian.* The instruments used in his observations were a gridiron pendulum clock, a two feet and a half reflector, an eighteen inch quadrant made by Mr Bird, and a transit instrument made by Mr Sisson.

By these instruments an observation was made, on the 10th of September 1783, of the occultation of a star of the ninth magnitude by the moon, during an eclipse of that planet, at York and Paris. Besides this, there were observations made of the immersions of ϕ *Aquarii* and δ *Piscium;* the result of all which was, that between Greenwich and York the difference of meridians was 4′ 27″.

In 1783, Mr Pigot informs us, that he thought of finding the difference of meridians by observing the meridian right ascensions of the moon's limb. This he thought had been quite original: but he found it afterwards in the Nautical Almanack for 1769, and in 1784 read a pamphlet on the same subject by the abbé Toaldo; but still found that the great exactness of this method was not suspected; though he is convinced that it must soon be universally adopted in preference to that from the first satellite of Jupiter.

After giving a number of observations on the satellites of Jupiter, he concludes, that the exactness expected from observations, even on the first satellite, is much overrated. "Among the various objections (says he), there is one I have often experienced, and, which proceeds solely from the disposition of the eye, that of seeing more distinctly at one time than another. It may not be improper also to mention, that the obser-

Longitude. vation I should have relied on as the best, that of August 30. 1785, marked *excellent*, is one of those most distant from the truth."

After giving a number of observations on the eclipse of the moon September 10. 1783, our author concludes, that the eclipses of the moon's spots are in general too much neglected, and that it might be relied upon much more were the following circumstances attended to: 1. To be particular in specifying the clearness of the sky. 2. To choose such spots as are well defined, and leave no hesitation as to the part eclipsed. 3. That every observer should use, as far as possible, telescopes equally powerful, or at least let the magnifying powers be the same. "A principal objection (says he) may still be urged, viz. the difficulty of distinguishing the true shadow from the penumbra. Was this obviated, I believe the results would be more exact than from Jupiter's first satellite: Undoubtedly the shadow appears better defined if magnified a little; but I am much inclined to think, that, with high magnifying powers, there is greater certainty of choosing the same part of the shadow, which perhaps is more than a sufficient compensation for the loss of distinctness."

The following rule for meridian observations of the moon's limb is next laid down: "The increase of the moon's right ascension in twelve hours (or any given time found by computation) is to 12 hours, as the increase of the moon's right ascension between two places found by observation is to the difference of meridians.

EXAMPLE.

November 30. 1782.

h.	′	″		
13	12	57.62	Meridian transit of moon's second limb	By clock at Greenwich.
13	13	29.08	Ditto of ♌	
		31.46	Difference of right ascension.	
13	14	8.05	Meridian transit of moon's second limb	By clock at York.
13	14	30.13	Ditto of ♌	
		32.08	Difference at York	The clocks going nearly sidereal time, no correction is required.
		31.46	Difference at Greenwich,	
		9.38	Increase of the moon's apparent right ascension between Greenwich and York, by observation.	

141″ in seconds of a degree, ditto, ditto, ditto.

The increase of the moon's right ascension for 12 hours, by computation, is 23,340 seconds; and 12 hours reduced into seconds is 43,200. Therefore, according to the rule stated above,

23,340″ : 43,200″ : diff. of merid. = 261″

"These easy observations and short reduction (says Mr Pigot) are the whole of the business. Instead of computing the moon's right ascension for 12 hours, I have constantly taken it from the Nautical Almanacks, which give it sufficiently exact, provided some attention be paid to the increase or decrease of the moon's motion. Were the following circumstances attended to, the results would be undoubtedly much more exact. Longitude.

"1. Compare the observations with the same made in several other places. 2. Let several and the same stars be observed at these places. 3. Such stars as are nearest in right ascension and declination to the moon are infinitely preferable. 4. It cannot be too strongly urged, to get, as near as possible, an equal number of observations of each limb, to take a mean of each set, and then a mean of both means. This will in a great measure correct the error of telescopes and sight. 5. The adjustment of the telescopes to the eye of the observer before the observation is also very necessary, as the sight is subject to vary. 6. A principal error proceeds from the observation of the moon's limb, which may be considerably lessened, if certain little round spots near each limb were also observed in settled observatories; in which case the libration of the moon will perhaps be a consideration. 7. When the difference of meridians, or of the latitudes of places is very considerable, the change of the moon's diameter becomes an equation.

"Though such are the requisites to use this method with advantage, only one or two of them have been employed in the observations that I have reduced. Two-thirds of these observations had not even the same stars observed at Greenwich and York; and yet none of the results, except a doubtful one, differ 15″ from the mean; therefore I think we may expect a still greater exactness, perhaps within 10″, if the above particulars be attended to.

"When the same stars are not observed, it is necessary for the observers at both places to compute their right ascension from tables, in order to get the apparent right ascension of the moon's limb. Though this is not so satisfactory as by actual observation, still the difference will be trifling, provided the star's right ascensions are accurately settled. I am also of opinion, that the same method can be put in practice by travellers with little trouble, and a transit instrument, constructed so as to fix up with facility in any place. It is not necessary, perhaps, that the instrument should be perfectly in the meridian for a few seconds of time, provided stars, nearly in the same parallel of declination with the moon, are observed; nay, I am inclined to think, that if the instrument deviates even a quarter or half a degree, or more, sufficient exactness can be attained; as a table might be computed, showing the moon's parallax and motion for such deviation; which last may easily be found by the well-known method of observing stars whose difference of declination is considerable.

"As travellers very seldom meet with situations to observe stars near the pole, or find a proper object for determining the error of the line of collimation, I shall recommend the following method as original.—Having computed the apparent right ascension of four, six, or more stars, which have nearly the same parallel of declination, observe half of them with the instrument inverted, and the other half when in its right position. If the difference of right ascensions between each set by observation agrees with the computation, there is no error; but if they disagree, half that disagreement is the error of the line of collimation. The same observations may also serve to determine,

Longitude. mine, whether the distances of the corresponding wires are equal. In case of necessity, each limb of the sun might be observed in the same manner, though probably with less precision. By a single trial I made above two years ago, the result was much more exact than I expected. Mayer's catalogue of stars will prove of great use to those that adopt the above method.—I am rather surprised that the immersions of known stars of the sixth and seventh magnitude, behind the dark limb of the moon, are not constantly observed in fixed observatories, as they would frequently be of great use,"

The annexed rule for finding the ship's place, with the miscellaneous observations on different methods, were drawn up by Mr John M'Lean of Edinburgh.

1. With regard to determining the ship's place by the help of the course and distance sailed, the following rule may be applied.—It will be found as expeditious as any of the common methods by the middle latitude or meridional parts; and is in some respects preferable, as the common tables of sines and tangents only are requisite in applying it.—Let a and b be the distances of two places from the same pole in degrees, or their complete latitude; c the angle which a meridian makes with the rhumb line passing through the places; and L the angle formed by their meridians, or the difference of longitude in minutes: then A and B being the logarithmic tangents of $\frac{1}{2}a$, and $\frac{1}{2}b$, the sine of C, and S the sine of $(C+1')$, we shall have the following equation: $L=\frac{A \backsim B}{S'-S'}$ (A). Also, from a well known property of the rhumb line, we have the following equation:

$S+E=R+D$, where S is the logarithmic cosine of C, E the logarithm of the length of the rhumb line, or distance, D the logarithm of the minutes difference of latitude, and R the logarithm of the radius.

By the help of these two equations, we shall have an easy solution of the several cases to which the middle latitude, or meridional parts, are commonly applied.

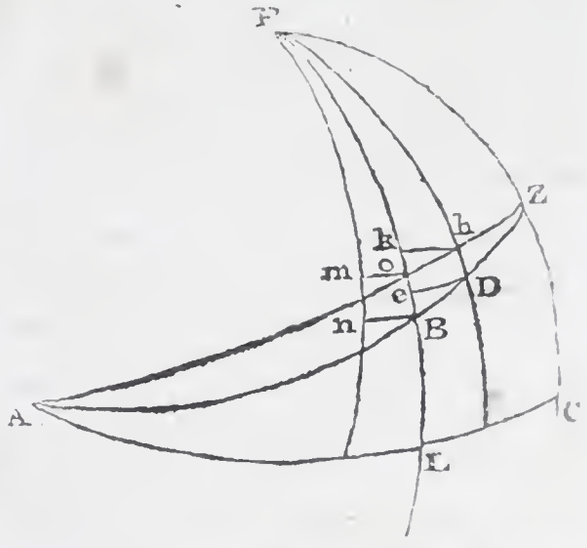
Exam. A ship from a port in latitude 56° N. sails S. W. by W. till she arrives at the latitude of 40° N: Required the difference of longitude?

Here $a=34°$, $b=50°$, $c=56°\ 15'$, A=9.48534, B=9.56107, S'=9.9199308, S=9.9198464; therefore, $L=\frac{A \backsim B}{S'-S}=\frac{757300}{844}=897$ the minutes difference of longitude. Also, S=9.74474, D=2.98227; therefore $E=R+D-S=3.23753$, to which the natural number is 1728, the miles in the rhumb line sailed over.

2. The common method of finding the difference of longitude made good upon several courses and distances, by means of the difference of latitude and departure made good upon the several courses, is not accurately true.

For example: If a ship should sail due south 600 miles, from a port in 60° north latitude, and then due west 600 miles, the difference of longitude found by the common methods of solution would be 1053: whereas the true difference of longitude is only 933, less than the former by 120 miles, which is more than one-eighth of the whole. Indeed every considerable alteration in the course will produce a very sensible error in the difference of longitude. Though, when the several rhumb lines sailed over are nearly in the same direction, the error in longitude will be but small. Longitude

The reason of this will easily appear from the annexed figure, in which the ship is supposed to sail from Z to A, along the rhumb lines ZB, BA; for if the meridians PZ,PkoeBL be drawn; and very near the latter other two meridians PhD, Pmn; and likewise the parallels of latitude Bn, De, mo, hk; then it is plain that De is greater than hk, (for De is to hk as the sine of DP to the sine of hP): and since this is the case everywhere, the departure corresponding to the distance BZ and course BZC, will be greater than the departure to the distance oZ and course oZC. And in the same manner, we prove that nB is greater than mo: and consequently, the departure corresponding to the distance AB, and course ABL, is greater than the departure to the distance Ao, and course AoL. Wherefore, the sum of the two departures corresponding to the courses ABL and BZC, and to the distances AB and BZ, is greater than the departure corresponding to the distance AZ and course AZC: therefore the course answering to this sum as a departure, and CZ as a difference of latitude, (AC being the parallel of latitudes passing through A), will be greater than the true course AZC made good upon the whole. And hence the difference of longitude found by the common rules will be greater than the true difference of longitudes; and the error will be greater or less according as BA deviates more or less from the direction of BZ.



3. Of determining the ship's longitude by lunar observations.

Several rules for this purpose have been lately published, the principal object of which seems to have been to

(A) A ∽ B signifies the difference between A and B.

Longitude. to abbreviate the computations requisite for determining the true distance of the sun or star from the moon's centre. This, however, should have certainly been less attended to than the investigation of a solution, in which considerable errors in the data may produce a small error in the required distance. When either of the luminaries has a small elevation, its altitude will be affected by the variableness of the atmosphere; likewise the altitude, as given by the quadrant, will be affected by the inaccuracy of the instrument, and the uncertainty necessarily attending all observations made at sea. The sum of these errors, when they all tend the same way, may be supposed to amount to at least one minute in altitude; which, in many cases, according to the common rules for computing the true distance, will produce an error of about 30 minutes in the longitude. Thus, in the example given by Mons. Callet, in the *Tables Portatives*, if we suppose an error of one minute in the sun's altitude, or call it 6° 26′ 34″, instead of 6° 27′ 34″; we shall find the alteration in distance according to his rule to be 54″, producing an error of about 27 minutes in the longitude; for the angle at the sun will be found, in the spherical triangle whose sides are the complement of the sun's altitude, complement of the moon's altitude, and observed distance, to be about 26°; and as radius is to the cosine of 26°, so is 16 the supposed error in altitude, to 54″ the alteration in distance. Perhaps the only method of determining the distance, so as not to be affected by the errors of altitude, is that by first finding the angles at the sun and moon, and by the help of them the corrections of distance for parallax and refraction. The rule is as follows:

Add together the complement of the moon's apparent altitude, the complement of the sun's apparent altitude, and the apparent distance of centres; from half the sum of these subtract the complement of the sun's altitude, and add together the logarithmic cosecant of the complement of the moon's altitude, the logarithmic cosecant of the apparent distance of centres, the logarithmic sine of the half sum, and the logarithmic sine of the remainder; and half the sum of these four logarithms, after rejecting 20 from the index, is the logarithmic cosine of half the angle at the moon. Longitud

As radius is to the cosine of the angle at the moon; so is the difference between the moon's parallax and refraction in altitude to a correction of distance; which is to be added to the apparent distance of centres when the angle at the moon is obtuse; but to be subtracted when that angle is acute, in order to have the distance once corrected.

In the above formula, if the word *sun* be changed for *moon*, and *vice versa*, wherever these terms occur, we shall find a second correction of distance to be applied to the distance, once corrected by subtraction when the angle at the sun is obtuse, but by addition when that angle is acute, and the remainder or sum is the true distance nearly.

In applying this rule, it will be sufficient to use the complement, altitude, and apparent distances of centres, true to the nearest minute only, as a small error in the angles at the sun and moon will very little affect the corrections of distances.

If D be the computed distance in seconds, d the difference between the moon's parallax and refraction in altitude, S the sine of the angle at the moon, and R the radius; then $\frac{d^2 S^2}{2DR}$ will be the third correction of distance, to be added to the distance twice corrected: But it is plain from the nature of this correction, that it may be always rejected, except when the distance D is very small, and the angle at the moon nearly equal to 90°.

This solution is likewise of use in finding the true distance of a star from the moon, by changing the word *sun* into *star*, and using the refraction of the star, instead of the difference between the refraction and parallax in the altitude of the sun, in finding the second correction of distance.

Ex. Given the observed distance of a star from the centre of the moon, 50° 8′ 41″; the moon's altitude, 55° 58′ 5″; the star's altitude, 19° 18′ 5″; and the moon's horizontal parallax, 1° 0′ 5″: Required the true distance.

Cosec.——0.02512——*'s co. alt.——70° 42′
D 's co. alt.——34 4——Cosec.——0.25169
Cosec.——0.11479——obs. dist.——50 9——Cosec.——0.11479

2)154 55

Sine——9.98950——77 27——Sine——9.98950

Rem. 6 45——Sine——9.07018

Sine——9.83688——Rem. 43 23——2)19.42616

2)19.96629

——Cosec.——9.71308——58° 54′
2

Cosec.——9.98314——15° 54′——117 48 = D 's angle.
2

31 48 = *'s angle.

Rad. : Cosec. 117° 48′ : : D 's diff. parall. & refract, 1980″ : 923″ = 1st correct. of distance.
Rad. : Cosec. 31° 48′ : : star's refract. 162″ : 138″ = 2d correct. of distance.

Here

Longitude || Longueville.

Here the first correction of distance is additive, since the angle at the moon is obtuse; and the second correction is also additive, since the angle at the star is acute: therefore their sum $923''+138''=1061''=17'\ 41''$, being added to $50^\circ\ 8'\ 41''$, the apparent distance of the star from the moon's centre, gives $50^\circ\ 26'\ 21''$ for the true distance of centres nearly;—and $2\times L\ (d+S)-L\ (2\ L\ R+L\ 2+L\ D)=L\ 8''$, which, being added to the distance twice corrected, gives $50^\circ\ 26'\ 29''$ for the true distance. By comparing this distance with the computed distances in the Ephemeris, the time at Greenwich corresponding to that of observing the distance will be known; and the difference of those times being converted into degrees and minutes, at the rate of 15 degrees to the hour, will give the longitude of the place of observation; which will be east if the time at the place be greater than that at Greenwich, but west if it be less.

LONGITUDINAL, in general, denotes something placed lengthwise: thus some of the fibres in the vessels of the human body are placed longitudinally, others transversely or across.

LONGOBARDI. See LOMBARDS.

LONGOMONTANUS, CHRISTIAN, a learned astronomer, born in a village of Denmark in 1562. He was the son of a ploughman; and was obliged to suffer during his studies all the hardships to which he could be exposed, dividing his time, like the philosopher Cleanthes, between the cultivation of the earth and the lessons he received from the minister of the place. At last, when he was 15, he stole away from his family, and went to Wiburg, where there was a college, in which he spent 11 years; and though he was obliged to earn a livelihood, he applied himself to study with such ardour, that among other sciences he learned the mathematics in great perfection. He afterwards went to Copenhagen; where the professors of that university in a short time conceived so high an opinion of him, that they recommended him to the celebrated Tycho Brahe. Longomontanus lived eight years with that famous astronomer, and was of great service to him in his observations and calculations. At length, being extremely desirous of obtaining a professor's chair in Denmark, Tycho Brahe consented, though with some difficulty, to deprive himself of his service; gave him a discharge, filled with the highest testimonies of his esteem; and furnished him with money for the expence of his long journey. He obtained a professorship of mathematics in the university of Copenhagen in 1605; and discharged the duty of it worthily till his death, which happened in 1647. He wrote many learned works; amused himself with endeavouring to square the circle, and pretended that he had made that discovery; but Dr John Pell, an English mathematician, attacked him warmly on that subject, and proved that he was mistaken.

LONGTOWN, a town of Cumberland, on the Scots borders, near the conflux of the Esk and Kirksop, 9 miles from Carlisle, and 313 miles from London. It has a market on Thursday, and a charity school for 60 children. The population in 1811 was estimated at 1579.

LONGUEVILLE, a town of France, in the department of Lower Seine, and in the territory of Caux, seated on the small river Lee, 17 miles north of Rouen. It has the title of a duchy. E. Long. 1. 10. N. Lat. 49. 46. Longueville || Lool.

LONGWY, a town of France, in the department of Moselle, with a castle, divided into the old and new towns. This last was built and fortified by Louis XIV. It is seated on an eminence. It was taken by the king of Prussia in 1792, but retaken two months after. E. Long. 5. 58. N. Lat. 49. 32.

LONGUS, a Greek sophist, author of a book entitled Ποιμενικα, or Pastorals, or a romance containing the loves of Daphnis and Chloe. Huetius, bishop of Avranches, speaks very advantageously of this work; but he censures the obscene touches with which it is interspersed. None of the ancient authors mention him, so that the time when he lived cannot be certainly fixed. There is an English translation of this author, which is ascribed to Mr J. Craggs, once secretary of state.

LONICERA, HONEYSUCKLE, a genus of plants belonging to the pentandria class. See BOTANY *Index*.

LONSDALE, or *Kirkby Lonsdale*, a town of Westmoreland, seated on the river Lon, in a pleasant and rich valley of the same name. It is a large well built town, has a handsome church, and a fine stone bridge over the river. It contained 1368 inhabitants in 1811, and is the best town in the county except Kendal. It gives title of earl to the Lowther family. W. Long. 2. 27. N. Lat. 54. 10.

LOO, a town of the United Provinces, in Guelderland, eight miles west of Deventer, where the prince of Orange has a fine palace. E. Long. 6. 0. N. Lat. 52. 18.

LOOF, the after part of a ship's bow; or that part of her side forward where the planks begin to be incurvated into an arch as they approach the stem.

LOOF, or *Luff*. See LUFF.

LOOK-OUT, in the sea-language, a watchful attention to some important object or event which is expected to arise from the present situation of a ship, &c. It is principally used in navigation when there is a probability of danger from the real or supposed proximity of land, rocks, enemies, and, in short, whatever peril she may encounter through inattention, which might otherwise have been avoided by a prudent and necessary vigilance.

There is always a look-out kept on a ship's forecastle at sea, to watch for any dangerous objects lying near her track, and to which she makes a gradual approach as she advances: the mate of the watch accordingly calls often from the quarter-deck, "Look out afore there!" to the persons appointed for this service.

LOOKING-GLASSES, are nothing but plain mirrors of glass, which, being impervious to the light, reflect the images of things placed before them. See the articles MIRROR and OPTICS.

For casting, grinding, and polishing looking-glasses, see the article GLASS.

For foliating looking-glasses, see the article FOLIATING.

LOOL, in *Metallurgy*, a vessel made to receive the washings of ores of metals. The heavier or more metalline parts of the ores remain in the trough in which they are washed; the lighter and more earthy run off with the water, but settle in the lool

LOOM.

Loom || Lord.

LOOM, the weaver's frame; a machine whereby several distinct threads are woven into one piece.

Looms are of various structures, accommodated to the various kinds of materials to be woven, and the various manner of weaving them; viz. for woollens, silks, linens, cottons, cloths of gold, and other works, as tapestry, ribbands, stockings, &c. divers of which will be found under their proper heads. See WEAVING.

The weaver's loom-engine, otherwise called the Dutch loom-engine, was brought into use from Holland to London, about the year 1676.

Heir-Loom, in *Law*. See *HEIR-Loom*.

LOOM, at sea. If a ship appears big, when at a distance, they say she looms, or appears a great sail: the term is also used to denote the indistinct appearance of any other distant objects.

Loom-gale, at sea, a gentle easy gale of wind, in which a ship can carry her top-sails a-trip.

LOOP, in the iron works, is a part of a sow or block of cast iron broken or melted off from the rest, and prepared for the forge or hammer. The usual method is, to break off the loop of about three quarters of a hundred weight. This loop they take up with their slinging-tongs, and beat it with iron sledges till they bring it to a four-square mass, of about two feet long, which they call a bloom.

LOPEZ DE VEGA. See VEGA.

LOPEZ, or *Indian Root*, in the *Materia Medica*. The plant to which this article belongs is unknown. Neither the woody nor cortical part of the root has any remarkable sensible quality. A slight bitterness is perceptible; and it is recommended, like simarouba, in diarrhœas, even of the colliquative kind, in half-dram doses four times a-day. Little of this root has been brought to Europe; but some of those who have had an opportunity of employing it, speak in very high terms of the effects obtained from it.

LOPHIUS, FISHING-FROG, *Toad-fish*, or *Sea devil*; a genus of the branchiostegous order of fishes. See ICHTHYOLOGY *Index*.

LORANTHUS, a genus of plants belonging to the hexandria class, and in the natural method ranking under the 48th order, *Aggregatæ*. See BOTANY *Index*.

LORARII, among the Romans, officers whose business it was, with whips and scourges, to compel the gladiators to engage. The *lorarii* also punished slaves who disobeyed their masters.

LORCA, a town of Spain, in the province of Murcia, containing about 30,000 inhabitants. It is divided into the upper and lower towns. The streets in the former are narrow, crooked, and steep, and the houses poor and ill-built; but the lower town is better laid out and built. The town has a collegiate chapter, eight parish churches, seven monasteries, two nunneries, two hospitals, and a college. There is also a saltpetre manufactory here. On the 30th April 1802, the bursting of an artificial basin of water above the town, swept away 600 houses, two hospitals, two convents, mills, &c. and destroyed 6000 people in the town and the adjacent country, over which its ravages extended for the space of 16 leagues. The total loss was estimated at more than two millions sterling.

LORD, a title of honour given to those who are noble either by birth or creation. In this sense, it amounts to much the same as *peer of the realm*, or *lord of parliament*. The title is by courtesy also given to all the sons of dukes and marquises, and to the eldest sons of earls: and it is also a title of honour bestowed on those who are honourable by their employments; as *lord advocate*, *lord chamberlain*, *lord chancellor*, *&c.* The word is Saxon, but abbreviated from two syllables into one; for it was originally *Hlaford*, which by dropping the aspiration became *Laford*, and afterwards by contraction *Lord*. "The etymology of the word (says J. Coates) is well worth observing; for it was composed of *hlaf* "a loaf of bread," and *ford*, "to give or afford;" so that *Hlaford*, now *Lord*, implies "a giver of bread;" because, in those ages, such great men kept extraordinary houses, and fed all the poor; for which reason they were called *givers of bread*, a thing now much out of date, great men being fond of retaining the title, but few regarding the practice for which it was first given. See LADY. Lord.

House of LORDS, one of the three estates of parliament, and composed of the Lords Spiritual and Temporal.

1. The *Spiritual Lords* consist of two archbishops and 24 bishops; and, at the dissolution of monasteries by Henry VIII. consisted likewise of 26 mitred abbots and two priors; a very considerable body, and in those times equal in number to the temporal nobility. All these hold, or are supposed to hold, certain ancient baronies under the king: for William the Conqueror thought proper to change the spiritual tenor of frank-almoign or free alms, under which the bishops held their lands during the Saxon government, into the feodal or Norman tenure by barony; which subjected their estates to all civil charges and assessments, from which they were before exempt; and in right of succession to those baronies, which were unalienable from their respective dignities, the bishops and abbots were allowed their seats in the house of lords. But though these lords spiritual are in the eye of the law a distinct estate from the lords temporal, and are so distinguished in most of our acts of parliament; yet in practice they are usually blended together under the name of *the lords*: they intermix in their votes, and the majority of such intermixture joins both estates. And from this want of a separate assembly, and separate negative of the prelates, some writers have argued very cogently, that the lords spiritual and temporal are now in reality only one estate: which is unquestionably true in every effectual sense, though the ancient distinction between them still nominally continues. For if a bill should pass their house, there is no doubt of its validity, though every lord spiritual should vote against it; of which Selden and Sir Edward Coke give many instances; as, on the other hand, doubtless it would be equally good, if the lords temporal present were inferior to the bishops in number, and every one of those temporal lords gave his vote to reject the bill; though this Sir Edward Coke seems to doubt of.

2. The *Temporal Lords* consist of all the peers of the realm (the bishops not being in strictness held to be such, but merely lords of parliament), by whatever title of nobility distinguished; dukes, marquises, earls, viscounts or barons*. Some of these sit by descent, as do all ancient peers; some by creation, as do all new

* See Nobility.

Lord

new made ones; others, since the union with Scotland, by election, which is the case of the 16 peers who represent the body of the Scots nobility. Their number is indefinite, and may be increased at will by the power of the crown: and once, in the reign of Queen Anne, there was an instance of creating no less than 12 together; in contemplation of which, in the reign of King George I. a bill passed the house of lords, and was countenanced by the then ministry, for limiting the number of the peerage. This was thought by some to promise a great acquisition to the constitution, by restraining the prerogative from gaining the ascendant in that august assembly, by pouring in at pleasure an unlimited number of new-created lords. But the bill was ill relished, and miscarried in the house of commons, whose leading members were then desirous to keep the avenues to the other house as open and easy as possible.

The distinction of ranks and honours is necessary in every well governed state: in order to reward such as are eminent for their services to the public, in a manner the most desirable to individuals, and yet without burden to the community; exciting thereby an ambitious yet laudable ardour and generous emulation in others. And emulation, or virtuous ambition, is a spring of action which, however dangerous or invidious in a mere republic or under a despotic sway, will certainly be attended with good effects under a free monarchy; where, without destroying its existence, its excesses may be continually restrained by that superior power from which all honour is derived. Such a spirit, when nationally diffused, gives life and vigour to the community; it sets all the wheels of government in motion, which, under a wise regulator, may be directed to any beneficial purpose; and thereby every individual may be made subservient to the public good, while he principally means to promote his own particular views. A body of nobility is also more particularly necessary in our mixed and compounded constitution, in order to support the rights of both the crown and the people, by forming a barrier to withstand the encroachments of both. It creates and preserves that gradual scale of dignity which proceeds from the peasant to the prince; rising like a pyramid from a broad foundation, and diminishing to a point as it rises. It is this ascending and contracting proportion that adds stability to any government; for when the departure is sudden from one extreme to another, we may pronounce that state to be precarious. The nobility therefore are the pillars, which are reared from among the people, more immediately to support the throne; and, if that falls, they must also be buried under its ruins. Accordingly, when in the last century the commons had determined to extirpate monarchy, they also voted the house of lords to be useless and dangerous. And since titles of nobility are thus expedient in the state, it is also expedient that their owners should form an independent and separate branch of the legislature. If they were confounded with the mass of the people, and like them had only a vote in electing representatives, their privileges would soon be borne down and overwhelmed by the popular torrent, which would effectually level all distinctions. It is therefore highly necessary that the body of nobles should have a distinct assembly, distinct deliberations, and distinct powers from the commons. See also KING, NOBILITY, PARLIAMENT, COMMONS, and COMMONALTY.

Lord || Loretto.

As to the peculiar laws and customs relating to the house of lords: One very ancient privilege is that declared by the charter of the forest, confirmed in parliament 9 Hen. III.; viz. that every lord spiritual or temporal summoned to parliament, and passing through the king's forests, may, both in going and returning, kill one or two of the king's deer without warrant; in view of the forester if he be present, or on blowing a horn if he be absent; that he may not seem to take the king's venison by stealth.

In the next place, they have a right to be attended, and constantly are, by the judges of the court of king's bench and common pleas, and such of the barons of the exchequer as are of the degree of the coif, or have been made serjeants at law; as likewise by the king's learned counsel, being serjeants, and by the masters of the court of chancery; for their advice in point of law, and for the greater dignity of their proceedings. The secretaries of state, with the attorney and solicitor general, were also used to attend the house of peers, and have to this day (together with the judges, &c.) their regular writs of summons issued out at the beginning of every parliament, *ad tractandum et consilium impendendum*, though not *ad consentiendum*, but, whenever of late years they have been members of the house of commons, their attendance here hath fallen into disuse.

Another privilege is, that every peer, by license obtained from the king, may make another lord of parliament his proxy, to vote for him in his absence: A privilege, which a member of the other house can by no means have, as he is himself but a proxy for a multitude of other people.

Each peer has also a right, by leave of the house, when a vote passes contrary to his sentiments, to enter his dissent on the journals of the house, with the reasons for such dissent; which is usually styled his protest.

All bills likewise, that may in their consequences any way affect the rights of the peerage, are by the custom of parliament to have their first rise and beginning in the house of peers, and to suffer no changes or amendments in the house of commons.

There is also one statute peculiarly relative to the house of lords; 6 Ann. c. 23. which regulates the election of the 16 representative peers of North Britain, in consequence of the 22d and 23d articles of the Union: and for that purpose prescribes the oaths, &c. to be taken by the electors; directs the mode of balloting; prohibits the peers electing from being attended in an unusual manner; and expressly provides, that no other matter shall be treated of in that assembly, save only the election, on pain of incurring a præmunire. See also the articles NOBILITY and PEERS.

LORDOSIS, (of λορδος, *bent inwards*), in the medical writings, a name given to a distempered state of the spine, in which it is bent inwards, or towards the anterior parts. It is used in opposition to *gibbous*, or *hump-backed*. See SURGERY.

LORETTO, a town of Italy, in the Marca or Marche of Ancona, with a bishop's see. It is small but fortified; and contains the famous *casa santa*, or

Loretto. holy chapel, so much visited by pilgrims. This chapel, according to the legend, was originally a small house in Nazareth, inhabited by the virgin Mary, in which she was saluted by the angel, and where she bred our Saviour. After their deaths, it was held in great veneration by all believers in Jesus, and at length consecrated into a chapel, and dedicated to the Virgin; upon which occasion St Luke made that identical image, which is still preserved here, and dignified with the name of our Lady of Loretto. This sanctified edifice was allowed to sojourn in Galilee as long as that district was inhabited by Christians; but when infidels got possession of the country, a band of angels, to save it from pollution, took it in their arms, and conveyed it from Nazareth to a castle in Dalmatia. This fact might have been called in question by incredulous people, had it been performed in a secret manner; but, that it might be manifest to the most short-sighted spectator, and evident to all who were not perfectly deaf as well as blind, a blaze of celestial light, and a concert of divine music, accompanied it during the whole journey; besides, when the angels, to rest themselves, set it down in a little wood near the road, all the trees of the forest bowed their heads to the ground, and continued in that respectful posture as long as the sacred chapel remained among them. But not having been entertained with suitable respect at the castle above mentioned, the same indefatigable angels carried it over the sea, and placed it in a field belonging to a noble lady called *Lauretta*, from whom the chapel takes its name. This field happened unfortunately to be frequented at that time by highwaymen and murderers: a circumstance with which the angels undoubtedly were not acquainted when they placed it there. After they were better informed they removed it to the top of a hill belonging to two brothers, where they imagined it would be perfectly secure from the dangers of robbery or assassination; but the two brothers, the proprietors of the ground, being equally enamoured of their new visitor, became jealous of each other, quarrelled, fought, and fell by mutual wounds. After this fatal catastrophe, the angels in waiting finally moved the holy chapel to the eminence where it now stands, and has stood these 400 years, having lost all relish for travelling.

The sacred chapel stands due east and west, at the farther end of a large church of the most durable stone of Istria, which has been built around it. This may be considered as the external covering, or as a kind of great coat to the *easa santa*, which has a smaller coat of more precious materials and workmanship nearer its body. This internal covering, or case, is of the choicest marble, after a plan of San Savino's, and ornamented with basso relievos, the workmanship of the best sculptors which Italy could furnish in the reign of Leo X. The subjects of these basso relievos are the history of the Blessed Virgin, and other parts of the Bible. The whole case is about 50 feet long, 30 in breadth, and the same in height: but the real house itself is no more than 32 feet in length, 14 in breadth, and at the sides about 18 feet in height; the centre of the roof is four or five feet higher. The walls of this little holy chapel are composed of pieces of a reddish substance, of an oblong square shape, laid one upon another, in the manner of brick. At first sight, on a superficial view, these red-coloured oblong substances appear to be nothing else than common Italian bricks; and, which is still more extraordinary, on a second and third view, with all possible attention, they still have the same appearance. Travellers, however, are assured with great earnestness, that there is not a single particle of brick in their whole composition, being entirely of a stone, which, though it cannot now be found in Palestine, was formerly very common, particularly in the neighbourhood of Nazareth. Loretto

The holy house is divided within into two unequal portions, by a kind of grate-work of silver. The division towards the west is about three-fourths of the whole; that to the east is called the *Sanctuary*. In the larger division, which may be considered as the main body of the house, the walls are left bare, to show the true original fabric of Nazareth stone; for they must not be supposed to be bricks. At the lower or western wall there is a window, the same through which the angel Gabriel entered at the Annunciation. The architraves of this window are covered with silver. There are a great number of golden and silver lamps in this chapel: one of the former, a present from the republic of Venice, is said to weigh 37 pounds, and some of the silver lamps weigh from 120 to 130 pounds. At the upper end of the largest room is an altar, but so low, that from it you may see the famous image which stands over the chimney in the small room or sanctuary. Golden and silver angels, of considerable size, kneel around her, some offering hearts of gold, enriched with diamonds, and one an infant of pure gold. The wall of the sanctuary is plated with silver, and adorned with crucifixes, precious stones, and votive gifts of various kinds. The figure of the Virgin herself by no means corresponds with the fine furniture of her house: She is a little woman, about four feet in height, with the features and complexion of a negro. Of all the sculptors that ever existed, assuredly St Luke, by whom this figure is said to have been made, is the least of a flatterer; and nothing can be a stronger proof of the Blessed Virgin's contempt for external beauty than her being satisfied with this representation of her. The figure of the infant Jesus, by St Luke, is of a piece with that of the Virgin: he holds a large golden globe in one hand, and the other is extended in the act of blessing. Both figures have crowns on their heads, enriched with diamonds: these were presents from Ann of Austria, queen of France. Both arms of the Virgin are enclosed within her robes, and no part but her face is to be seen; her dress is most magnificent, but in a wretched bad taste: this is not surprising, for she has no female attendant. She has particular clothes for the different feasts held in honour of her, and, which is not quite so decent, is always dressed and undressed by the priests belonging to the chapel; her robes are ornamented with all kinds of precious stones down to the hem of her garment.

There is a small place behind the sanctuary, in which are shown the chimney, and some other furniture, which they pretend belonged to the Virgin when she lived at Nazareth; particularly a little earthen porringer, out of which the infant used to eat. The pilgrims bring rosaries, little crucifixes, and agnus dei's which the obliging priest shakes for half a minute

Loretto. nute in this dish; after which it is believed they acquire the virtue of curing various diseases, and prove an excellent preventive of all temptations of Satan. The gown which the image had on when the chapel arrived from Nazareth is of red camblet, and carefully kept in a glass shrine.

Above 100 masses are daily said in this chapel, and in the church in which it stands. The jewels and riches to be seen at any one time in the holy chapel are of a small value in comparison of those in the treasury, which is a large room adjoining to the vestry of the great church. In the presses of this room are kept those presents which royal, noble, and rich bigots of all ranks, have, by oppressing their subjects and injuring their families, sent to this place. To enumerate every particular would fill volumes. They consist of various utensils and other things in silver and gold; as lamps, candlesticks, goblets, crowns, and crucifixes; lamps, eagles, saints, apostles, angels, virgins, and infants: then there are cameos, pearls, gems, and precious stones, of all kinds and in great numbers. What is valued above all the other jewels is, the miraculous pearl, wherein they assert that Nature has given a faithful delineation of the Virgin sitting on a cloud with the infant Jesus in her arms. There was not room in the presses of the treasury to hold all the silver pieces which had been presented to the Virgin. Several other presses in the vestry are completely full. It is said that those pieces are occasionally melted down by his holiness for the use of the state: and also that the most precious of the jewels are picked out and sold for the same purpose, false stones being substituted in their room.

Pilgrimages to Loretto are not so frequent with foreigners, or with Italians of fortune and distinction, as formerly; nineteen out of twenty of those who make this journey now are poor people, who depend for their maintenance on the charity they receive on the road. To those who are in such a rank in life as precludes them from availing themselves of the charitable institutions for the maintenance of pilgrims, such journeys are attended with expence and inconveniency; and fathers and husbands, in moderate or confined circumstances, are frequently brought to disagreeable dilemmas, by the rash vows of going to Loretto which their wives or daughters are apt to make on any supposed deliverance from danger. To refuse, is considered by the whole neighbourhood as cruel, and even impious; and to grant, is often highly distressing, particularly to such husbands as, from affection or any other motives, do not choose that their wives should be long out of their sight. But the poor, who are maintained during their whole journey, and have nothing more than a bare maintenance to expect from their labour at home, to them a journey to Loretto is a party of pleasure as well as devotion, and by much the most agreeable road they can take to heaven. The greatest concourse of pilgrims is at the seasons of Easter and Whitsuntide. The rich travel in their carriages: A great number come on horseback or on mules; or, what is still more common, on asses. Great numbers of females come in this manner, with a male friend walking by them as their guide and protector: but the greatest number of both sexes are on foot. The pilgrims on foot, as soon as they enter the suburbs, begin a hymn in honour of the Virgin, which they continue till they reach the church. The poorer sort are received into an hospital, where they have bed and board for three days. Loretto.

The only trade of Loretto consists of rosaries, crucifixes, little madonas, agnus dei's, and medals, which are manufactured here, and sold to pilgrims. There are great numbers of shops full of these commodities, some of them of a high price; but infinitely the greater part are adapted to the purses of the buyers, and sold for a mere trifle. The evident poverty of those manufacturers and traders, and of the inhabitants of this town in general, is a sufficient proof that the reputation of our Lady of Loretto is greatly on the decline.

In the great church which contains the holy chapel are confessionals, where the penitents from every country of Europe may be confessed in their own language, priests being always in waiting for that purpose: each of them has a long white rod in his hand, with which he touches the heads of those to whom he thinks it proper to give absolution. They place themselves on their knees in groups around the confessional chair; and when the holy father has touched their heads with the expiatory rod, they retire, freed from the burden of their sins, and with renewed courage to begin a fresh account.

In the spacious area before this church there is an elegant marble fountain, supplied with water from an adjoining hill by an aqueduct. Few even of the most inconsiderable towns of Italy are without the useful ornament of a public fountain. The embellishments of sculpture and architecture are employed with great propriety on such works, which are continually in the people's view; the air is refreshed and the eye delighted by the streams of water they pour forth; a sight peculiarly agreeable in a warm climate. In this area there is also a statue of Sixtus V. in brouze. Over the portal of the church itself is a statue of the Virgin; and above the middle gate is a Latin inscription, importing that within is the house of the mother of God, in which the Word was made flesh. The gates of the church are likewise of brouze, embellished with basso relievos of admirable workmanship: the subjects taken partly from the Old and partly from the New Testament, and divided into different compartments. As the gates of this church are shut at noon, the pilgrims who arrive after that time can get no nearer the *santa casa* than these gates, which are by this means sometimes exposed to the first violence of that holy ardour which was designed for the chapel itself. All the sculpture upon the gates which is within reach of the mouths of those zealots, is in some degree effaced by their kisses.

There are also several paintings to be seen here, some of which are highly esteemed, particularly two in the treasury. The subject of one of these is the Virgin's Nativity, by Annibal Caracci; and of the other, a Holy Family by Raphael. There are some others of considerable merit which ornament the altars of the great church. These altars, or little chapels, of which this fabric contains a great number, are lined with marble and embellished by sculpture; but nothing within this church interests a traveller of sensibility so much as the iron grates before those chapels, which

Loretto || Lorne.

were made of the fetters and chains of the Christian slaves, who were freed from bondage by the glorious victory of Lepanto.

The palace where the governor resides stands near the church, and the ecclesiasties who are employed in it lodge in the same palace, where they receive the pilgrims of high distinetion. The environs of this town are very agreeable, and in fine weather the high mountains of Croatia may be seen from hence. It is seated on a mountain, in E. Long. 13. 50. N. Lat. 43. 24.

LORICA, was a cuirass, brigantine, or coat of mail, in use among the Roman soldiers. It was generally made of leather, and is supposed to be derived from *lorum*.—The loricæ were set with plates of metal in various forms: sometimes in hooks or rings like a chain, sometimes like feathers, and sometimes like the scales of serpents or fishes, to which plates of gold were often added. There were other lighter cuirasses, consisting only of many folds of linen cloth, or of flax made strong enough to resist weapons. Such soldiers as were rated under 1000 drachms, instead of the loriea now deseribed, wore a *pectorale*.—The Roman loriea was made like a shirt, and defended the wearer both before and behind, but was so contrived that the back part could be occasionally separated from the front. Some of the loricæ were made of cords of hemp or flax, close set together; whence they are called *thoraces bilices*, *trilices*, &c. from the number of the cords fixed one upon another; but these were used rather in hunting than in the field of battle.

LORIS, in *Zoology*. See LEMUR, MAMMALIA *Index*.

LORIMERS, one of the companies of London, that make bits for bridles, spurs, and such like small iron ware. They are mentioned in statute 1 Rich. II. c. 12.—The word seems derived from the Latin word *lorum*, "a thong."

LORME, PHILIBERT DE, one of the most celebrated architects in the 16th century, was born at Lyons. Queen Catherine de Medicis gave him the superintendance of buildings; and he had the direction of those of the Louvre, the Thuilleries, the castle of St Anet, St Germains, and other edifiees erected by her orders. He also wrote several books on architecture. He died about the year 1577.

LORNE, a division of Argyllshire in Scotland, which gives the title of marquis to the duke of Argyll. It extends above 30 miles in length from north to south, and about nine at its utmost breadth; bounded on the east by Braidalbin; on the west by the islands; on the north by Lochaber; and is divided from Knapdale on the south by Loch Etive, on the banks of which stands the castle of Beregonium, wherein the courts of justice were anciently held. This district, abounding with lakes, is the most pleasant and fertile part of Argyllshire, producing plenty of oats and barley. It once belonged to the ancient family of Macdougal, still residing on the spot; but devolved to the lords of Argyll in consequence of a marriage with the heiress, at that time a branch of the Stuart family. The chief place of note in this district is the castle of Dunstaffnage, a seat of the Scottish kings previous to the conquest of the Picts in 843 by Kenneth II. In this place was long preserved the famous stone, the palladium of North Britain; brought, says legend, out of Spain, where it was first used as a seat of justiee by Gathelus, eoeval with Moses. It continued here as the coronation chair till the reign of Kenneth II. who removed it to Scone, in order to secure his reign; for, aeeording to the inseription, Lorne.

Ni fallat fatum, Scoti quocunque locatum,
Invenient lapidem, regnare tenentur ibidem.

Some of the ancient regalia were preserved till the present century, when the keeper's servants, during his infirm years, embezzled them for the silver ornaments; and left only a battleaxe, nine feet long, of beautiful workmanship, and ornamented with silver.

The castle is square; the inside only 87 feet; partly ruinous, partly habitable. At three of the corners are round towers; one of them projects very little. The entranee is towards the sea at present by a staircase, in old times probably by a drawbridge, which fell from a little gateway. The masonry appears very ancient; the tops battlemented. This pile is seated on a rock at the mouth of Loch Etive, whose waters expand within to a beautiful bay, where ships may safely ride in all weather. Of this building, the founder of which is unknown, nothing remains except the outer walls, which though roofless, are still in good order; and within which some buildings have been erected, which serve as the residenee of the laird. The duke of Argyll is hereditary keeper under the crown.—At a small distanee from the eastle is a ruined chapel, onee an elegant building; and at one end an enclosure, a family cemetery. Opposite to these is a high precipice, ending abrupt, and turning suddenly towards the south-east. A person concealed in the recess of the rock, a little beyond the angle, surprises friends stationed at some distance beneath the precipiee with a very remarkable echo of any word, or even sentenee, he pronounees; which reaches the last distinet and unbroken. The repetition is single, but remarkably clear.

In 1307, this castle was possessed by Alexander Macdougal lord of Argyll, a friend to the English: but was that year redueed by Robert Bruee, when Macdougal sued for peaee with that prince, and was received into favour.

We find, about the year 1455, this to have been a residence of the lords of the isles; for here James last earl of Douglas, after his defeat in Annandale, fled to Donald, the Regulus of the time, and prevailed on him to take arms and carry on a plundering war against his monarch James II.

The situation of this regal seat was calculated for pleasure as well as strength. The views of mountains, valleys, waters, and islands, are delightful. On the north side of Loch Etive stood the town of Beregonium, supposed to have been the eapital of the West Highlands. It seems from certain mounds, exeavations, and other appearances, to have been a strong fortress, to prevent invasion, or to seeure a retreat, as oeeasions might require. On the bank of the same loch is the site of Ardchattan, a priory of monks of Valliscaullium in Burgundy, founded in 1230 by Donald Maceoul, ancestor of the Macdougals of Lorne. Here Robert Bruce, who remained master of this eountry before he got entire possession of Scotland, held a parliament

Lorne || Loten.

liament or council.—The country abounds in Druidical, Danish, and other monuments.

LORRAIN, a sovereign state of Europe, bounded on the north by Luxemburg and the archbishopric of Treves, on the east by Alsace and the duchy of Deux Ponts, on the south by Franche Compte, and on the west by Champagne and the duchy of Barr. It is about 100 miles in length, and 75 in breadth; and abounds in all sorts of corn, wine, hemp, flax, rape-seed, game and fish, with which it carries on some trade, and in general all the necessaries of life. There are fine meadows and large forests, with mines of iron, silver, and copper, as also salt pits. There are a great number of rivers; of which the principal are the Maese or Meuse, the Moselle, the Scille, the Meure, and the Sarre. It is divided into three parts; the duchy of Lorrain, properly so called, which was heretofore a sovereign state; the duchy of Barr, which formerly belonged to the dukes of Lorrain, but afterwards came under the government of France; and the third comprehends the three bishopries of Metz, Toul, and Verdun, which have belonged to France ever since the year 1552. In 1733, the emperor of Germany being at war with France, this last got possession of the duchy of Lorrain: and when there was a peace made in 1735, it was agreed, that Stanislaus king of Poland, father-in-law to the king of France, should possess these duchies, and that after his death they should be united for ever to the crown of France. It was also then agreed, that Francis Stephen, duke of Lorrain, and the emperor's son-in-law, should have the grand duchy of Tuscany as an equivalent for Lorrain. After the death of the great duke of Tuscany, in 1737, King Stanislaus and the duke of Lorrain took possession of their respective dominions, and the cession was confirmed and guaranteed by a treaty in 1738. The trade consists in corn and linen cloth. Nanci is the capital town.

LORRAIN, *Robert le*, an eminent sculptor, born at Paris in 1666. From his infancy, he made so rapid a progress in the art of designing, that at the age of 18 the celebrated Girardon intrusted him with the care of teaching his children and correcting his disciples. He committed to him also, in conjunction with Nonlisson, the execution of the famous tomb of Cardinal Richelieu in the Sorbonne, and his own tomb at St Landres in Paris. On his return from Rome, he finished several pieces at Marseilles, which had been left imperfect by the death of M. Puget. He was received into the academy of sculpture in 1701. His *chef d'œuvre* is Galatea, a work universally admired. Lorrain afterwards made a Bacchus for the gardens at Versailles, a Faun for those of Marly; and several bronzes, among which is an Andromeda; all in an excellent taste. This artist succeeded chiefly in heads; and more particularly in that of young girls, which he performed with incomparable delicacy and truth.

LORRAIN, *Claude*. See CLAUDE.

LOTEN, JOHN, a good landscape painter of the English school; though a native of Switzerland. His taste led him to solemn and dreary scenes, as landstorms accompanied with showers of rain, &c. and he seldom omitted to introduce oak trees in his prospects: his landscapes are generally large; and he painted with nature, truth, and force. But the effect of his composition had been much greater if he had been less cold in his colouring; for the judicious eye is not pleased with the darkish tint that predominates in it. He died in London about 1681. Loten, Lothian.

LOTHIAN, a name given to three counties of Scotland, viz. Haddingtonshire, Edinburghshire, and Linlithgowshire; otherwise called *East*, *Mid*, and *West*, Lothians.

1. East Lothian, or Haddingtonshire, is bounded on the north-west by the frith of Forth; and on the east by the German sea; on the south-east by Berwickshire; and on the west by the county of Edinburgh. It extends about 25 miles from east to west, and where broadest, nearly 15 from north to south; the area is about 297 square miles. Of the whole county about 64 parts in the hundred are arable, 16 meadows or low lying ground, and 20 hills and wastes. This is one of the most fruitful counties in Scotland, producing great quantities of wheat and all sorts of grain, well watered, and plentifully supplied with fish, fowl, fuel, and all the necessaries of life. It abounds with towns, villages, and farms, interspersed with a great number of agreeable houses belonging to persons of rank and fortune. Beside farming, which is successfully carried on, the people towards the sea-coast employ themselves in the fishery, salt-making, and in foreign trade; and some of the more inland inhabitants engage in the linen and woollen manufactures. Limestone and coal are found in most parts of the county, and great numbers of sheep are fed on the hills of Lammermuir. See HADDINGTONSHIRE, SUPPLEMENT.

2. Edinburghshire, or Mid Lothian, is about 35 miles long, but varies in its breadth in different places from five to 16 miles; area 358 square miles. It is bounded on the east by Haddingtonshire; on the west by the shire of Linlithgow; on the south, by Peeblesshire; and on the north, by part of West Lothian and the frith of Forth. The aspect of the country is in general level and pleasant, interspersed with a few hills, that help to exhibit agreeable prospects. It is well watered with rivers, and shaded with woods. It produces plenty of coal, limestone, a soft black marble, and some copper ore. The soil, of itself fertile, is finely cultivated, and yields as plentiful harvests of excellent wheat as are found in any part of Great Britain. The whole shire is interspersed with noble houses and plantations belonging to noblemen and gentlemen of fortune. The farmers, in general, are skilful and wealthy. The country is well inhabited, and presents us with a good number of towns and populous villages. Along the sea coast the common people subsist by fishing, and traffic in coals and salt, and some few carry on a smuggling commerce. Those in the inland are employed in farming, and some branches of the weaving manufacture. Edinburgh is a county within itself. See EDINBURGHSHIRE, SUPPLEMENT.

3. The shire of Linlithgow, or West Lothian, is bounded on the north by the frith of Forth. The small river Almond divides it from Edinburghshire on the east. On the south-west it joins the county of Lanark; and on the west, it is parted from Stirlingshire by Avon, a small river. Its form, though irregular, approaches to a parallelogram. It measures from north-east to south-west, 20 miles. It breadth, except on the shore of the frith, does not exceed 12.—The country is pleasant and fertile, abounding with corn and pasturage.

Lothian || Lottery.

pasturage. Here is found plenty of coal, limestone, and lead ore; nay, in the reign of James VI. it produced a rich mine of silver. See LINLITHGOWSHIRE, SUPPLEMENT.

LOTION is, strictly speaking, such washing as concerns beautifying the skin, by cleansing it of those deformities which a distempered blood throws upon it. Medicines of this kind, however, are for the most part insignificant, and sometimes very dangerous; the only proper method of treating these disorders is, by administering such medicines as tend to correct the morbid state of the constitution from whence they arise.

LOTION, in *Pharmacy*, denotes a preparation of medicines, by washing them in some liquid, either made very light, so as to take away only the dregs; or sharp, so as to penetrate them, in order to clear them of some salt or corrosive spirit, as is done to antimony, precipitates, magisteries, &c. or intended to take away some foulness or ill quality, or to communicate some good one.

LOTOPHAGI, in *Ancient Geography*, a people of the Regio Syrtica (so called from their living on the lotus); inhabiting between the two Syrtes, from the Cinyphus to the Triton. The lotus was said to be a food so luscious, as to make strangers forget their native country. A sweet wine was expressed from it, which did not keep above ten days, (Pliny).

LOTOPHAGI of Homer. See MENINX.

LOTTERY, a kind of public game at hazard, frequent in Britain, France, and Holland, in order to raise money for the service of the state; being appointed with us by the authority of parliament, and managed by commissioners appointed by the lords of the treasury for that purpose. It consists of several numbers of blanks and prizes, which are drawn out of wheels, one of which contains the numbers, and the other the corresponding blanks or prizes.

The Romans invented lotteries to enliven their Saturnalia. This festival began by the distribution of tickets which gained some prize. Augustus made lotteries which consisted of things of little value; but Nero established some for the people, in which 1000 tickets were distributed daily, and several of those who were favoured by fortune got rich by them. Heliogabalus invented some very singular: the prizes were either of great value or of none at all: one gained a prize of six slaves, and another of six flies; some got valuable vases, and others vases of common earth.

The first English lottery we find mentioned in history was drawn A. D. 1569. It consisted of 40,000 lots, at 10s. each lot: the prizes were plate; and the profits were to go towards repairing the havens of this kingdom. It was drawn at the west door of St Paul's cathedral. The drawing began on the 11th of January 1569, and continued incessantly, *day and night*, till the 6th of May following; as Maitland, from Stowe, informs us in his history, vol. i. p. 257. There were then only *three* lottery offices in London. The proposals for this lottery were published in the years 1567 and 1568. It was at first intended to have been drawn at the house of Mr Dericke, her majesty's servant, i. e. her jeweller, but was afterwards drawn as above mentioned.

Dr Rawlinson showed the Antiquarian Society, 1748, "A proposal for a very rich lottery general without any blankes, contayning a great number of good prizes, as well of redy money as of plate and certain sorts of merchandizes, having been valued and prised by the commandment of the queene's most excellent majestie's order, to the intent that such commodities as may chance to arise thereof after the charges borne may be converted towards the reparations of the havens and strength of the realme, and towards such other public good workes. The number of lotts shall be foure hundred thousand, and no more; and every lott shall be the summe of tenne shillings sterling, and no more. To be filled by the feast of St Bartholomew. The shew of prizes are to be seen in Cheapside, at the sign of the Queene's Armes, the house of Mr Dericke, goldsmith, servant to the queene. Some other orders about it in 1567-8. Printed by Hen. Bynneyman."

Lottery, Lotus.

In the reign of Queen Anne, it was thought necessary to suppress lotteries, as nuisances to the public. Since that time, however, they have been licensed by an act of parliament, under various regulations. The act passed in 1778 restrains any person from keeping an office for the sale of tickets, shares, or chances, or for buying, selling, ensuring, or registering, without a license; for which license each office-keeper must pay 50l. to continue in force for one year, and the produce to be applied towards defraying the expence of the lottery. And no person is allowed to sell any share or chance less than a sixteenth, on the penalty of 50l. All tickets divided into shares or chances are to be deposited in an office, to be established in London by the commissioners of the treasury, who are to appoint a person to conduct the business thereof; and all shares are to be stamped by the said officer, who is to give a receipt for every ticket deposited with him. The numbers of all tickets so deposited are to be entered in a book, with the names of the owners, and the number of shares into which they are divided. All tickets deposited in the office are to remain there three days after the drawing. And any person keeping an office, or selling shares, or who shall publish any scheme for receiving moneys in consideration of any interest to be granted in any ticket in the said lottery, &c. without being in possession of such ticket, shall forfeit 500l. and suffer three months imprisonment. And no business is to be transacted at any of the offices after eight in the evening, except on the evening of the Saturday preceding the drawing. No person is to keep any office for the sale of tickets, &c. in Oxford or Cambridge, on penalty of 20l. Before this regulating statute took place, there were upwards of 400 lottery offices in and about London only; but the whole number afterwards, for all Britain, as appeared by the list published by authority, amounted to no more than 51. They have, however, increased greatly again.

Some farther regulations to prevent the frauds committed by insurances were made in 1793. In 1808 the reports of a committee of the house of commons disclosed a dreadful scene of vice and misery brought on by lotteries, and recommended their abolition, or at least that they should be put under other regulations. Their suggestions, however, have had but little effect hitherto. The gross sum received by government from the lottery, is estimated to be 750,000l. per annum, of which 500,000l. is for tickets, and the remainder for postages, stamps, &c.

LOTUS, or BIRD'S-FOOT TREFOIL; a genus of plants

Lotus || Love.

plants belonging to the diadelphia class; and in the natural method ranking under the 32d order, *Papilionaceæ*. See BOTANY *Index*.

Lotus of Homer. See DIOSPYROS,
Egyptian Lotus. See NYMPHÆA,
Libyan Lotus. See RHAMNUS,
} BOTANY *Index*.

LOVAGE. See LIGUSTICUM,

LOVE, in a large sense of the word, denotes all those affections of the pleasing kind which objects and incidents raise in us; thus we are said to *love* not only intelligent agents of morally good dispositions, but also sensual pleasures, riches, and honours. But

LOVE, in its usual and more appropriate signification, may be defined, "that affection which, being compounded of animal desire, esteem, and benevolence, becomes the bond of attachment and union between individuals of the different sexes; and makes them feel in the society of each other a species of happiness which they experience no where else." We call it an *affection* rather than a *passion*, because it involves a desire of the happiness of its object: And that its constituent parts are those which have been just enumerated, we shall first endeavour to prove, and then proceed to trace its rise and progress from a selfish appetite to a generous sentiment.

Animal desire is the actual energy of the sensual appetite: and that it is an essential part of the complex affection, which is properly called *love*, is apparent from this consideration, that though a man may have sentiments of esteem and benevolence towards women who are both old and ugly, he never supposes himself to be in love of any woman, to whom he feels not the sensual appetite to have a stronger tendency than to other individuals of her sex. On the other hand, that animal desire *alone* cannot be called the affection of love is evident; because he who gratifies such a desire without esteeming its object, and wishing to communicate at the same time that he receives enjoyment, loves not the woman, but himself. Mere animal desire has nothing in view but the species and the sex of its object; and before it make a selection, it must be combined with sentiments very different from itself. The first sentiment with which it is combined, and by which a man is induced to prefer one woman to another, seems to be that by which we are delighted with gracefulness of person, regularity of features, and beauty of complexion. It is not indeed to be denied that there is something irresistible in female beauty. The most severe will not pretend that they do not feel an immediate prepossession in favour of a handsome woman: but this prepossession, even when combined with animal desire, does not constitute the whole of that affection which is called *love*. Savages feel the influence of the sensual appetite, and it is extremely probable that they have some ideas of beauty; but among savages the affection of love is seldom felt. Even among the lower orders of civil society it seems to be a very gross passion, and to have in it more of the selfishness of appetite than of the generosity of esteem. To these observations many exceptions will no doubt be found (A): but we speak of savages in general, and of the great body of the labouring poor, who in the choice of their mates do not study—who indeed are incapable of studying, that rectitude of mind, and those delicacies of sentiment, without which neither man nor woman can deserve to be esteemed. Love.

In the savage state, and even in the first stages of refinement, the bond of union between the sexes seems to consist of nothing more than mere animal desire and instinctive tenderness for their infant progeny. The former impels them to unite for the propagation of the species; and the latter preserves the union, till the children, who are the fruit of it, be able to provide for their own subsistence. That in such unions, whether casual or permanent, there is no mutual esteem and benevolence, is apparent from the state of subjection in which women are held in rude and uncultivated nations, as well as from the manner in which marriages are in such nations contracted.

Sweetness of temper, a capital article with us in the female character, displays itself externally in mild looks and gentle manners, and is the first and perhaps the most powerful inducement to love in a cultivated mind. "But such graces (says an ingenious writer*) are scarce discernible in a female savage; and even in the most polished woman would not be perceived by a male savage. Among savages, strength and boldness are the only valuable qualities. In these, females are miserably deficient; for which reason they are contemned by the males as beings of an inferior order. The North American tribes glory in idleness: the drudgery of labour degrades a *man* in their opinion, and is proper for *women* only. To join young persons in marriage is accordingly the business of the parents; and it would be unpardonable *meanness* in the bridegroom to show any *fondness* for the bride. In Guiana a woman never eats with her *husband*, but after every meal attends him with water for washing; and in the Caribbee islands she is not even permitted to eat in the *presence* of her husband. Dampier observes in general, that among all the wild nations with which he was acquainted, the women carry the burdens, while the men walk before and carry nothing but their arms; and that women even of the highest rank are not better treated. In Siberia, and even in Russia, the capital excepted, men till very lately treated their wives in every respect like slaves. It might indeed be thought, that animal desire, were there nothing else, should have raised women to some degree of estimation among men; but male savages, utter strangers to decency and refinement, gratify animal desire with as little ceremony as they do hunger or thirst.

* *Sketches of the History of Man.*

"Hence it was that in the early ages of society a man *purchased* a woman to be his wife, as one purchases an ox or a sheep to be food; and valued her only as she contributed to his sensual gratification. Instances innumerable might be collected from every nation of which we are acquainted with the early history; but we

(A) Such as the negroes whose story is so pathetically told by Addison in N° 215. of the Spectator; the two lovers who were killed by lightning at Staunton-Harcourt, August 9. 1718, (see *Pope's Letters*); and many others which will occur to every reader.

Love. we shall content ourselves with mentioning a few. Abraham bought Rebekah, and gave her to his son Isaac for a wife*. Jacob having nothing else to give, served Laban 14 years for two wives†. To David, demanding Saul's daughter in marriage, it was said, 'The king desireth not any dowry, but an hundred foreskins of the Philistines‡.' In the Iliad Agamemnon offers his daughter to Achilles for a wife; and says that he would not demand for her any *price* §. By the laws of Ethelbert king of England, a man who committed adultery with his neighbour's wife was obliged to pay the husband a fine, and to *buy him another wife*||." But it is needless to multiply instances; the practice has prevailed universally among nations emerging from the savage sate, or in the rudest stage of society: and wherever it prevailed, men could not possibly have for the fair sex any of that tender regard and esteem which constitute so essential a part of the complex affection of love.

* Gen. xxiv.
† Gen. xxix.
‡ 1 Sam. xviii. 28.
§ Lib. ix.
|| Sect. 32.

Accordingly we find the magnanimous Achilles an absolute stranger to that generous affection, though his heart was susceptible of the warmest and purest friendship. His attachment to Patroclus was so heroically disinterested, that he willingly sacrificed his own life to revenge the death of his friend; but when Agamemnon threatened to rob him of his favourite female captive, though he felt the insult offered to his *pride*, he never spoke of the *woman* but as a *slave* whom he was concerned to preserve in point of *honour*, and as a testimony of his *glory*. Hence it is that we never hear him mention her but as his *spoil*, the *reward of war*, or the *gift* which the Grecians gave him.

"And dar'st thou threat to snatch my *prize* away,
"Due to the deeds of many a dreadful day?
"A *prize* as *small*, O tyrant! match'd with thine,
"As thy own actions if compar'd with mine.
"Thine in each conquest is the *wealthy prey*,
"Tho' mine the sweat and danger of the day.
"Some *trivial present* to my ships I bear,
"Or barren praises pay the wounds of war."

And again, after upbraiding the general with his tyranny and want of regard to merit, he adds, with the greatest indifference as to the charms of the *woman*,

"Seize on Briseïs, whom the Grecians doom'd
"My *prize of war*, yet tamely see *resum'd*;
"And seize secure; no more Achilles draws
"His conquering sword in any woman's cause.
"The gods command me to forgive the past;
"But let this first *invasion* be the last:
"For know, thy blood, when *next* thou dar'st *invade*,
"Shall stream in vengeance on my reeking blade."

Love.

Pope has made the language of this rough warrior less inconsistent with the peculiar resentment natural to an injured lover than it is in the original (B); but from the last quoted passage, even as translated by him, it is apparent that Achilles would have been equally hurt had Agamemnon threatened to deprive him of any other part of his plunder. Accordingly he yields up Briseis, not in grief for a mistress whom he loses, but in sullenness for an injury that is done him. Nor let it be imagined, that this coldness proceeded from the pride of the hero, which would not permit him to acknowledge his love of a captive. With the generous affection of love captives and princesses were equally incapable of inspiring him. He repeatedly affirmed indeed that he delighted in his fair Lyrnessian slave, but it was only as an instrument of sensual gratification; for as to every thing else in a woman, he was so totally indifferent, that he declared he would not, when he should be disposed to marry, give himself the trouble to make a *choice*, but leave the whole matter to his father.

"If heav'n restore me to my realms with life,
"The rev'rend Peleus shall elect my wife."

Even Agamemnon, of whom Pope and Madame Dacier think more favourably as a lover, speaks the very same language when mentioning his favourite captive Chryseis. In his furious debate with Achilles he calls her indeed—

"A maid, unmatch'd in manners as in face,
"Skill'd in each art, and crown'd with ev'ry grace."

And adds,

"Not half so dear were Clytemnestra's charms,
"When first her blooming beauties blest my arms."

But this was said merely to enhance the value of the *prize*, which for the public good he was about to resign; for that she was dear to him only as ministering to his pleasure, is past dispute from the language which he had previously held with her father, as well as from his requiring grateful Greece to pay a just *equivalent*, and to repair his *private loss*. A man who really *loves* would have thought nothing an *equivalent* for the object of his love; much less would he have insinuated to her father

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(B) The original passages are:

Και δη μοι γερας αυτος αφαιρησεσθαι απειλεις,
Ω επι πολλ' εμογησα, δοσαν δε μοι υιες Αχαιων.
Ου μεν σοι ποτε ισον εχω γερας, οπποτ' Αχαιοι
Τρωων εκπερσωσ' ευναιομενον πτολιεθρον.
Αλλα το μεν πλειον πολυαικος πολεμοιο
Χειρες εμαι διεπουσ' αταρ ην ποτε δασμος ικηται,
Σοι το γερας πολυ μειζον, εγω δ' ολιγον τε φιλον τε
Ερχομ' ηχων επι νηας, επην κεκαμω πολεμιζων.
Iliad, lib. i.

And, Αλλο δε τοι ερεω, συ δ' ενι φρεσι βαλλεο σησι·
Χερσι μεν ουτι εγωγε μαχησομαι, εινεκα κουρης,
Ουτε σοι, ουτε τω αλλω, επει μ' αφελεσθε γε δωτες.
Των δ' αλλων, α μοι εστι θοη παρα νηι μελαινη,
Των ουκ αν τι φερois ανελων, αεκητος εμειο·
Ει δ' αγε μην, πειρησαι, ινα γνωωσι και οιδε.
Αιψα τοι αιμα κελαινον ερωησει περι δουρι.

In this latter passage the hero says expressly, "I will not fight with you or with any other man for the sake of a *girl*; but you shall not rob me of any other part of my *property*:" which is surely the language of a man to whose heart love must have been an utter stranger.

Love. father a possibility of his dismissing from his embrace a woman whom he esteemed, when time should have robbed her of every youthful grace.

Since, then, it is so apparent, that in the heroic age of Greece even princes and kings were strangers to the generous affection of love, it needs not occasion much surprise that the same affection has very little influence upon mankind in the lowest ranks of the most polished societies of modern Europe. That this is actually the case, that among the generality of uneducated men and women there is no other bond of attachment than the sensual appetite, every year furnishes multiplied proofs. We daily see youths, rejected by their mistresses, paying their addresses without delay to girls who, in looks, temper, and disposition, are diametrically opposite to those whom so lately they pretended to love: We daily see maidens, slighted by their lovers, receiving the addresses of men, who, in nothing but their sex, resemble those to whom a week before they wished to be married: and we believe it is not very uncommon to find a girl entertaining several lovers together, that if one or more of them should prove false, she may still have a chance not to be totally deserted. Did esteem and benevolence, placed on manners and character, constitute any part of vulgar love, these people would act very differently; for they would find it impossible to change their lovers and their mistresses with the same ease that they change their clothes.

To this account of love, as it appears in savage nations, some one may perhaps oppose the paintings of the softer passion in the poems of Ossian. That bard describes the female character as commanding respect and esteem, and the Caledonian heroes as cherishing for their mistresses a flame so pure and elevated as never was surpassed, and has seldom been equalled, in those ages which we commonly call most enlightened. This is indeed true: and it is one of the many reasons which have induced Johnson and others to pronounce the whole a modern fiction. Into that debate we do not enter. We may admit the authenticity of the poems, without acknowledging that they furnish any exception to our general theory. They furnish indeed in the manners which they describe a wonderful anomaly in the general history of man. All other nations of which we read were in the hunter state savage and cruel. The Caledonians, as exhibited by Ossian, are gentle and magnanimous. The heroes of Homer fought for plunder, and felt no clemency for a vanquished foe. The heroes of Ossian fought for fame; and when their enemies were subdued, they took them to their bosoms. The first of Greeks committed a mean insult on the dead body of the first of Trojans. Among the Caledonians insults offered to the dead, as well as cruelty to the living, were condemned as infamous. The heroes of Ossian appear in no instance as savages. How they came to be polished and refined before they were acquainted with agriculture and the most useful arts of life, it is not our business to inquire; but since they unquestionably were so, their treatment of the female sex, instead of opposing, confirms our theory; for we never conceived rich clothes, superb houses, highly-dressed food, or even the knowledge of foreign tongues, to be necessary to the acquisition of a generous sentiment. Luxury indeed appears to be as inimical to love as barbarism: and we believe, that in modern nations, the tender and exalted affection which deserves that name is as little known among the highest orders of life as among the lowest. Perhaps the Caledonian ladies of Ossian resembled in their manners the German ladies of Tacitus, who accompanied their husbands to the chase, fought by their sides in battle, and partook with them of every danger. If so, they could not fail to be respected by a race of heroes among whom courage took place of all other virtues: and this single circumstance, from whatever cause it might proceed, will sufficiently account for the estimation of the female character among the ancient Germans and Caledonians, so different from that in which it has been held in almost every other barbarous nation. Love.

But if among savages and the vulgar, love be unknown, it cannot possibly be an instinctive affection: and therefore it may be asked, How it gets possession of the human heart; and by what means we can judge whether in any particular instance it be real or imaginary? These questions are of importance, and deserve to be fully answered; though many circumstances conspire to render it no easy task to give to them such answers as shall be perfectly satisfactory. Love can subsist only between *individuals* of the different sexes. A man can hardly *love two women* at the same time; and we believe that a woman is still *less* capable of *loving at once more than one man*. Love, therefore, has a natural tendency to make men and women pair, or, in other words, it is the source of marriage: but in polished society, where alone this affection has any place, so many things besides mutual attachment are necessary to make the married life comfortable, that we rarely see young persons uniting from the impulse of love, and have therefore but few opportunities of tracing the rise, progress, and consequences of the affection. We shall, however, throw together such reflections as have occurred to us on the subject, not without indulging a hope, that they may be useful to the younger part of our readers when forming the most important connexion in life.

We have said, that the perception of beauty, combined with animal desire, is the first inducement which a man can have to prefer one woman to another. It may be added, that elegance of figure, a placid masculine countenance, with a person which indicates strength and agility, are the qualities which first tend to attach any woman to a particular man. Beauty has been defined *, "That particular form, which is the most common of all particular forms to be met with in the same species of beings." Let us apply this definition to our own species, and try, by means of it, to ascertain what constitutes the beauty of the human face. It is evident, that of countenances we find a number almost infinite of different forms, of which forms one only constitutes beauty, whilst the rest, however numerous, constitute what is *not beauty*, but *deformity* or *ugliness*. To an attentive observer, however, it is evident, that of the numerous particular forms of *ugliness*, there is not one which includes so many faces as are formed after that particular cast which constitutes *beauty*. Every particular species of the animal as well as the vegetable creation, may be said to have a fixed or determinate form, to which, as to a centre, nature is continually inclining. Or it may

* By Pere Buffier in his *First Truths* and Sir Joshua Reynolds in the *Idler*.

Love. be compared to pendulums vibrating in different directions over one central point; and as they *all* cross the *centre*, though only *one* passes through any *other point;* so it will be found that *perfect beauty* is oftener produced by nature than deformity: we do not mean than deformity in *general*, but than any *one kind* and *degree* of deformity. To instance in a particular part of a human feature; the line which forms the ridge of the nose is deemed beautiful when it is *straight;* but this is likewise the *central* form, which is oftener found than any one *particular degree* of *concave*, *convex*, or any *other* irregular form that shall be proposed. As we are then more accustomed to beauty than deformity, we may conclude *that* to be the reason why we approve and admire it, just as we approve and admire fashions of dress for no other reason than that we are used to them. The same thing may be said of colour as of form: it is custom alone which determines our preference of the colour of the *Europeans* to that of the *Ethiopians*, and which makes them prefer their own colour to ours; so that though habit and custom cannot be the *cause* of beauty (see BEAUTY), they are certainly the cause of our liking it.

That we *do like it* cannot be denied. Every one is conscious of a pleasing emotion when contemplating beauty either in man or woman; and when that pleasure is combined with the gratification of the sensual appetite, it is obvious that the sum of enjoyment must be greatly increased. The perception of beauty, therefore, necessarily directs the energy of the sensual appetite to a *particular* object; but still this combination is a mere selfish feeling, which regards its object only as the *best* of many *similar* instruments of pleasure. Before it can deserve the name of *love*, it must be combined with esteem, which is never bestowed but upon moral character and internal worth; for let a woman be ever so beautiful, and of course ever so desirable as an instrument of sensual gratification, if she be not possessed of the virtues and dispositions which are peculiar to her sex, she will inspire no man with a generous affection. With regard to the outlines, indeed, whether of internal disposition or of external form, men and women are the same; but nature, intending them for mates, has given them dispositions, which though concordant, are, however, different, so as to produce together delicious harmony. "The man, more robust, is fitted for severe labour, and for field exercise; the woman, more delicate, is fitted for sedentary occupations, and particularly for nursing children. The man, bold and vigorous, is qualified for being a protector *; the woman, delicate and timid, requires protection. Hence it is, that a man never admires a woman for possessing bodily strength or personal courage; and women always despise men who are totally destitute of these qualities. The man, as a protector, is directed by nature to govern; the woman, conscious of inferiority, is disposed to obey. Their intellectual powers correspond to the destination of nature. Men have penetration and solid judgment to fit them for governing; women have sufficient understanding to make a decent figure under a good government: a greater proportion would excite dangerous rivalship between the sexes, which nature has avoided by giving them different talents. Women have more imagination and sensibility than men, which make all their enjoyments more exquisite; at the same time that they are better qualified to communicate enjoyment. Add another capital difference of disposition: the gentle and insinuating manners of the female sex tend to soften the roughness of the other sex; and wherever women are indulged with any freedom, they polish sooner than men.

* *Sketches of Man.*

Love.

"These are not the only particulars that distinguish the sexes. With respect to the ultimate end of love, it is the privilege of the male, as superior and protector, to make a choice: the female, preferred, has no privilege but barely to consent or to refuse. Whether this distinction be the immediate result of the originally different dispositions of the sexes, or only the effect of associations inevitably formed, may be questioned; but among all nations it is the practice for men to court, and for women to be courted: and were the most beautiful woman on earth to invert this practice, she would forfeit the esteem, however by her external grace she might excite the desire, of the man whom she addressed. The great moral virtues which may be comprehended under the general term *integrity*, are all absolutely necessary to make either men or women estimable; but to procure esteem to the female character, the modesty peculiar to their sex is a very essential circumstance. Nature hath provided them with it as a defence against the artful solicitations of the other sex before marriage, and also as a support of conjugal fidelity.

A woman, therefore, whose dispositions are gentle, delicate, and rather timid than bold, who is possessed of a large share of sensibility and modesty, and whose manners are soft and insinuating, must, upon moral principles (see MORAL PHILOSOPHY), command the esteem and benevolence of every individual of the other sex who is possessed of sound understanding; but if her person be deformed, or not such as to excite some degree of animal desire, she will attract no man's love. In like manner, a man whose moral character is good, whose understanding is acute, and whose conversation is instructive, must command the esteem of every sensible and virtuous woman; but if his figure be disagreeable, his manner unpolished, his habits slovenly, and, above all, if he be deficient in personal courage, he will hardly excite desire in the female breast. It is only when the qualities which command esteem are, in the same person, united with those which excite desire, that the individual so accomplished can be an object of love to one of the other sex; but when these qualities are thus united, each of them increases the other in the imagination of the lover. The beauty of his mistress gives her, in his apprehension, a greater share of gentleness, modesty, and every thing which adorns the female character, than perhaps she really possesses; whilst his persuasion of her internal worth makes him, on the other hand, apprehend her beauty to be absolutely unrivalled.

To this theory an objection readily offers itself, which it is incumbent upon us to obviate. Men and women sometimes fall in love at first sight, and very often before they have opportunities of forming a just estimate of each other's moral character: How is this circumstance to be reconciled with the progressive generation of love? We answer, By an association of ideas, which is formed upon principles of physiogno-

my.

Love. my. Every passion and habitual disposition of mind gives a particular cast to the countenance, and is apt to discover itself in some feature of the face. This we learn by experience; and in time, without any effort of our own, the idea of each particular cast of countenance comes to be so closely associated in our minds with the internal disposition which it indicates, that the one can never afterwards be presented to our view without instantly suggesting the other to the imagination. See METAPHYSICS and PHYSIOGNOMY). Hence it is that every man, who has been accustomed to make observations, naturally forms to himself, from the features and lineaments of a stranger's face, some opinion of his character and fortune. We are no sooner presented to a person for the first time, than we are immediately impressed with the idea of a proud, a reserved, an affable, or a good-natured man; and upon our going into a company of absolute strangers, our benevolence or aversion, our awe or contempt, rises instantly towards particular persons, before we have heard them speak a word, or know so much as their names or designations. The same thing happens when we are presented to the fair sex. If a woman, seen for the first time, have that particular cast of countenance, and that expression of features, to which we have associated notions of *gentleness*, *modesty*, and other female virtues, she instantly commands our *esteem*; and if she have likewise so much *beauty* as to make her an object of particular *desire*, esteem and desire become suddenly combined; and that combination constitutes the affection of love. Such, too, is the nature of all mental associations, that each part of which they are composed adds strength and vividness to the other parts; so that, in the present instance, desire makes us imagine virtues in the woman which her countenance perhaps does not indicate; and the virtues which are there actually visible, make us apprehend her beauty as more perfect than it is.

The affection thus generated is more or less pure, and will be more or less permanent, according as the one or the other part of which it is compounded predominates. "Where desire of possession* prevails over our esteem of the person and merits of the desirable object, love loses its benevolent character: the appetite for gratification becomes ungovernable, and tends violently to its end, regardless of the misery that must follow. In that state love is no longer a sweet agreeable affection: it becomes a selfish, painful passion, which, like hunger and thirst, produceth no happiness but in the instant of fruition; and when fruition is over, disgust and aversion generally succeed to desire. On the other hand, where esteem, founded on a virtuous character and gentle manners, prevails over animal desire, the lover would not for the world gratify his appetite at the expence of his mistress's honour or peace of mind. He wishes, indeed, for enjoyment; and to him enjoyment is more exquisite than to the mere sensual lover, because it unites sentiment with the gratification of sense; at the same time that, so far from being succeeded by disgust or aversion, it increases his benevolence to the woman, whose character and manners he esteems, and who has contributed so much to his pleasure. Benevolence to an individual, having a general end, admits of acts without number, and is seldom fully accomplished. Hence mutual love, which is composed chiefly of esteem and benevolence, can hardly be of a shorter duration than its objects. Frequent enjoyment endears such lovers to each other, and makes constancy a pleasure; and when the days of sensual enjoyment are over, esteem and benevolence will remain in the mind, making sweet, even in old age, the society of that pair, in whom are collected the affections of husband, wife, lover, friend, the tenderest affections of human nature." Love.

From the whole of this investigation, we think it appears, that the affection between the sexes which deserves the name of *love*, is inseparably connected with virtue and delicacy; that a man of loose morals cannot be a faithful or a generous lover; that in the breast of him who has ranged from woman to woman for the mere gratification of his sensual appetite, desire must have effaced all esteem for the female character; and that, therefore, the maxim too generally received, "that a reformed rake makes the best husband," has very seldom a *chance* to be true. We think it may likewise be inferred, that thousands fancy themselves in love who know not what love is, or how it is generated in the human breast: and therefore we beg leave to advise such of our readers as may imagine themselves to be in that state, to examine their own minds, with a view to discover, whether, if the objects of their love were old and ugly, they would still esteem them for the virtues of their character, and the propriety of their manners. This is a question which deserves to be well weighed by the young and the amorous, who in forming the matrimonial connexion, are too often blindly impelled by the mere animal desire inflamed by beauty. "It may indeed happen†, after the pleasure of gratifying that desire is gone (and if not refined by esteem and benevolence, go it must with a swift pace), that a new bond of attachment may be formed upon more dignified and more lasting principles; but this is a dangerous experiment. Even supposing good sense, good temper, and internal worth of every sort, yet a new attachment upon such qualifications is rarely formed; because it *commonly* or rather *always*, happens, that such qualifications, the only solid foundation of that indissoluble connexion, if they did not originally make esteem predominate over animal desire, are afterwards rendered altogether invisible by satiety of enjoyment creating disgust."

LOVE, in *Medicine*. The symptoms produced by this passion as a disease, according to medical writers, are as follow: The eyelids often twinkle; the eyes are hollow, and yet appear as if full with pleasure: the pulse is not peculiar to the passion, but the same with that which attends solicitude and care. When the object of this affection is thought of, particularly if the idea is sudden, the spirits are confused, the pulse changes, and its force and time are very variable: in some instances, the person is sad and watchful; in others, the person, not being conscious of his state, pines away, is slothful, and regardless of food; though the wiser, when they find themselves in love, seek pleasant company and active entertainments. As the force of love prevails, sighs grow deeper; a tremor affects the heart and pulse; the countenance is alternately pale and red; the voice is suppressed in the fauces; the eyes grow dim; cold sweats break out; sleep absents itself, at least until the morning; the secretions

* *Sketches of Man.*

† *Elements of Criticism.*

Love. become disturbed; and a loss of appetite, a hectic fever, melancholy, or perhaps madness, if not death, constitutes the sad catastrophe. On this subject the curious may consult Ægineta, lib. iii. cap. 17. Oribat. Synop. lib. viii. cap. 9. or a treatise professedly written on love, as it is a distemper, by James Ferrard, Oxford, printed 1640.

The manners of the Greeks and Romans were similar to each other in the affairs of love. They generally made a discovery of their passion by writing upon trees, walls, doors, &c. the name of their beloved. They usually decked the door of their dulcinea with flowers and garlands, made libations of wine before their houses, sprinkling the posts with the same liquor, as if the object of their affection was a real goddess. For a man's garland to be untied, and for a woman to compose a garland, were held to be indubitable indications of their love.

When their love was without success, they used several arts to excite affection in the object of their desire. They had recourse to enchantresses, of whom the Thessalian were in the highest estimation. The means made use of were most commonly philtres or love potions, the operation of which was violent and dangerous, and frequently deprived such as drank them of their reason. Some of the most remarkable ingredients of which they were composed were, the hippomanes, the jynx, insects bred from putrefaction, the fish remora, the lizard, brains of a calf, the hairs on the tip of a wolf's tail, his secret parts, the bones of the left side of a toad eaten with ants, the blood of doves, bones of snakes, feathers of screech-owls, twisted cords of wool in which a person had hanged himself, rags, torches, reliques, a nest of swallows buried and famished in the earth, bones snatched from hungry bitches, the marrow of a boy famished in the midst of plenty, dried human liver; to these may be added several herbs growing out of putrid substances. Such were the ingredients that entered into the composition of that infernal draught a *love potion*.

But, besides the philtres, various other arts were used to excite love, in which the application of certain substances was to have a magical influence on the person against whom they levelled their skill. A hyæna's udder worn under the left arm, they fancied would draw the affections of whatever woman they fixed their eyes upon. That species of olives called πίυρα, and barley-bran made up into a paste, and thrown into the fire, they thought would excite the flame of love. Flour was used with the same intention. Burning laurel, and melted wax, were supposed to have the like effect. When one heart was to be hardened, and another mollified, clay and wax were exposed to the same fire together. Images of wax were frequently used, representing the persons on whom they wished to make an impression; and whatever was done to the substitute of wax, they imagined was felt by the person represented. Enchanted medicaments were often sprinkled on some part of the house where the person resided. Love-pledges were supposed to be of singular use and efficacy; these they placed under their threshold, to preserve the affections of the owner from wandering. Love-knots were of singular power, and the number three was particularly observed in all they did. But no good effect was expected, if the use of these things was not attended with charms or magical verses and forms of words. See MAGIC.

Love || Lough-Neagh. Having mentioned their arts of exciting love, it may not be amiss to take notice, that the ancients imagined, that love excited by magic may be allayed by more powerful spells and medicaments, or by applying to demons more powerful than those who had been concerned in raising that passion. But love inspired without magic had no cure; Apollo himself could find no remedy, but cried out

Hei mihi quod nullis amor est medicabilis herbis.

The antidotes against love were generally *agnus castus*, which has the power of weakening the generative faculty; sprinkling the dust in which a mule had rolled herself; tying toads in the hide of a beast newly slain; applying amulets of minerals or herbs, which were supposed of great efficacy in other cases; and invoking the assistance of the inferior deities. Another cure for love was bathing in the waters of the river Selemnus; to which we may add the lover's leap, or jumping down from the Leucadian promontory.

Love-Apple. See SOLANUM, BOTANY *Index*.

LOVENTINUM, or LUENTINUM, in *Ancient Geography*, a town of the Demetæ in Britain, near the mouth of the Tuerobis or Tivy. Supposed to have been afterwards swallowed up by an earthquake, and to have stood where is now the lake called *Llin Savatan* in Brecknockshire.

LOUGHBOROUGH, a town of Leicestershire in England, 110 miles from London. It is the second town in the county, and was in the Saxons time a royal village. Its market is on Thursday; the number of inhabitants in 1811 was 5400. It has a large church, and a free school; besides a charity school for 80 boys, and another for 20 girls. It has been very much reduced by fires; but is still a very agreeable town, with rich meadow-ground, on the fosse, which runs here almost parallel with the river Soar. The new canal has made the coal trade here very extensive.

LOUGHBRICKLAND, a town of Ireland, situated in the county of Down, and province of Ulster, 58 miles from Dublin. The name signifies the lake of the *speckled trout*; and it was so called from a lake near it, which abounds with those fish. It consists of one broad street, at the end of which is the parish church, said to have been built by Dr Taylor when bishop of Dromore, soon after the Restoration. The linen manufacture is carried on here very extensively; and the town is a great thoroughfare, the turnpike road from Dublin to Belfast passing near it.

LOUGH-DERG, anciently *Derg-abhan*, i. e. "the river of the woody morasss," from a river which issues out of this lake. This lough is situated in the county of Donegal and province of Ulster in Ireland, and is famous for having in it the island that contains St Patrick's purgatory, which is a narrow little cell, hewn out of the solid rock, in which a man could scarce stand upright. There is also a lake of this name situated between the counties of Galway and Tipperary.

LOUGH-NEAGH, a loch or lake of Ireland, situated in the counties of Armagh, Down, Derry, and Antrim, and province of Ulster. This lake is 20 miles in

Lough-Neagh, Lough-Strangford.

in length, and varies from 8 to 12 miles in breadth. The area of this lake is computed to be 100,000 acres. It is remarkable for a healing virtue; and likewise for petrifying wood, which is not only found in the water but in the adjacent soil at a considerable depth. On its shores several beautiful gems have been discovered. Its ancient name was *Loch-Eacha*, or *Loch-Neach*, from *loch*, "a lake," and *Neach*, "wonderful, divine, or eminent." Its petrifying powers are not instantaneous, as several of the ancients have supposed, but require a long series of ages to bring them to perfection, and appear to be occasioned by a fine mud or sand, which insinuates itself into the pores of the wood, and which in process of time becomes hard like stone. On the borders of this lake is Shane's castle, the elegant seat of Lord O'Neil. Dr Smyth seems to doubt whether the healing quality in this lake is not to be confined to one side of it, called the *fishing-bank;* and he informs us, that this virtue was discovered in the reign of Charles II. in the instance of the son of one Mr Cunningham, who had an *evil* which run on him in eight or ten places; and notwithstanding all applications, seemed incurable: at length he was perfectly healed, after bathing in this lough about eight days. Hence that writer gives us another derivation of the name *Loch-Neach*, which (he says) seems to him to hint at this quality; *Neasg* or *Neas*, in Irish, signifying "a sore or ulcer," which might not improbably be corrupted into *Neach*: Hence he apprehends, this lake was remarked at a much earlier period for its healing property. As to its petrifying power, it is mentioned by Nenius, a writer of the 9th century, who says, "Est aliud stagnum quod facit ligna dureseere in lapides. Homines autem findunt ligna, et postquam formaverunt, projiciunt in stagnum, et manent in eo usque ad caput anni, et in capite anni lapis invenitur; et vocatur stagnum *Luch-Echach*." Lough-Neagh gives title of baron to the family of *Skeffington*.

LOUGH-STRANGFORD, a lake of Ireland, situated in the county of Down and province of Ulster. It takes its present name from a small port-town called *Strangford*, seated on the west side of the narrow entrance into the sea. It was formerly known by the name of *Lough-Cone* or *Lough Coyne*. It is a deep bay or inlet of the sea, about 17 miles long and four or five broad; it goes west as far as Downpatrick, and north as far as Comber and Newton, and by computation covers 25,775 acres, Irish plantation measure. It abounds with excellent fish, particularly smelts; and off the bar there is a periodical herring fishery in or about August. The bar or entrance into the lough is about three miles below Strangford. There is a long rock at the entrance in the middle of the passage, dangerous to strangers on account of the current; yet there is a broad passage on either side, and deep water. The current here is very strong and rapid, running at the rate of six or seven miles an hour. There are but few vessels that go higher up than Strangford. A good many vessels bound up the channel put in here, if the wind is unfavourable to their passage. The islands in this lake are numerous; Dr Boat enumerates them at 260. But from an actual survey, made at the time Dr Smyth wrote his history of that county, it appears, there are 54 islands small and great, known by particular names, and many others nameless; the contents of these 54 islands added together amount to 954 acres and a half. The great and profitable manufacture carried on in these islands, and the flat stony coasts surrounding the lake, is the burning of sea-weed into kelp, which employs a number of hands, and has been computed to produce to the several proprietors a neat profit of 1000l. per annum and upwards. Four of the islands here are called *Swan islands*, from the number of swans that frequent them.

Lough-Strangford || Louisiana.

LOUIS, or St Louis, *Knights of*, the name of a military order in France, instituted by Louis XIV. in 1693. Their colours were of a flame colour, and pass from left to right; the king was their grand master. There were in it eight great crosses, and 24 commanders; the number of knights was not limited. At the time of their institution, the king charged his revenue with a fund of 900,000 livres for the pensions of the commanders and knights.

LOUIS, *Lewis*, *Louis d'or*, or *Lewidore*, a French coin, first struck in 1640, under the reign of Louis XIII. and which has now a considerable currency. See MONEY-*Table*.

LOUISIANA, an extensive country of North America, lying between Mexico and the river Mississippi, and now forming one of the united states of the North American republic. The name was originally given to a region extending from the gulf of Mexico, northward and westward to an unknown distance, but is now confined to the southern part of this territory. Louisiana was originally discovered and settled by the French; and, after remaining in their hands for about a century, it was transferred to Spain by treaty in 1762. In 1801 Spain gave up the colony again to France, by whom it was sold to the United States in 1803 for sixty millions of francs. In 1812 Louisiana was erected into a state, and admitted as a member of the union. It extends between 29° and 33° of north latitude, and between the river Sabine on the west, and the Perdido on the east, embracing an area of 45,860 square miles.

The greater part of the country is a level plain, and that part which reaches from the sea-shore, 20 or 30 miles inward, is a morass on a level with high water, without trees or shrubs. The Mississippi flows through the eastern part of it; and as its waters have generally a higher level than the adjoining country, the cultivated parts are protected from inundation by embankments. This great river sends off part of its waters by lateral courses to the sea, and forms a kind of delta. A considerable part of the country is overflowed during the annual swell of the river in May and June, which then rises 50 feet in the upper part of its course; but at New Orleans, within 100 miles of the sea, the rise is only 12 feet. The richest soil is along the banks of the Mississippi and its branches; the other parts are either swampy, or light and sandy. It abounds with a great variety of wood, and the wild vine is extremely common. The settlements are confined chiefly to the banks of the streams. The population in 1810 was 86,556; but in 1814 was estimated at 101,700. Of this population 30,000 reside in the capital, New Orleans, which is situated about 100 miles from the mouth of the river, and carries on a very extensive trade. It has now become the centre of trade for the states situated on the western side of the Alleghany mountains

Louisiana. mountains, and has increased more rapidly within the last ten years than any other town in the United States. The produce received from the upper country is immense; between 300 and 400 sea vessels arrive and depart annually, and about 900 flat-bottomed boats and barges descend the river from the western territories. The river communication has been much improved by the use of steam-boats, which are now numerous upon the Mississippi and Ohio. These have also been employed as drag-boats to assist loaded vessels in ascending from the sea to New Orleans. The principal exports are cotton, tobacco, sugar, and flour. The exports of Louisiana in 1817 amounted to 9,024,812 dollars, of which 8,241,254 were domestic produce, and 783,558 foreign produce. The tonnage belonging to New Orleans in 1815 was 17,204. (*Warden's Account of the United States.*)

The agricultural productions of Louisiana are the same with those of the other southern states; but sugar is now cultivated to a greater extent here than in any other part of the union. The cane is planted in January, February, or March, and ripens in October. The average produce is estimated at 800 or 1000 pounds per acre. The quantity made on the Mississippi alone in 1812 was estimated at ten millions of pounds. It is computed that there are one million of acres in the state adapted to the culture of sugar. Tobacco and cotton are also cultivated to a considerable extent. Of the latter 20,000 bales were exported in 1812. Rice is cultivated in swampy places unfit for any other species of grain, and the produce is estimated at 15 barrels per acre, each weighing 200 pounds. Maize is raised, but this plant, as well as wheat, rye, barley and oats, do not thrive so well as in states farther north, and are not very much cultivated. Figs and olives succeed, and it is believed that silk would be found profitable. The sweet orange, the citron, lemon, and lime, are cultivated below the 30th parallel. Immense herds of cattle are raised in the natural meadows of Opelousas and Atakapas. The mutton is considered to be superior to that of the northern states, the other kinds of flesh inferior. In the richest and most populous parts of the country plantations bring from 40 to 50 dollars an acre, exclusive of slaves and buildings. The profits of a slave are estimated at 140 dollars per annum. Negro tradesmen are let or hired at from 20 to 30 dollars a month. Some planters have a yearly income of 20,000 dollars, and possess from 10,000 to 20,000 head of cattle.

There are no manufactures of much importance in this state. Salt is made at two or three places. Within 60 miles above, and an equal distance below New Orleans, there are 36 saw mills, some of which are driven by steam, and others by water let off by small openings in the banks of the Mississippi. Pitch and tar are manufactured, and of the cane or reed are made hats, sieves, baskets, mats, &c. Candles are made of the vegetable wax derived from the *Myrtica cerifera.*

Louisiana is in many parts rather unhealthy. Bilious fever prevails generally in autumn, and the yellow fever has several times made its appearance. Sore throat, tetanus, and dysentery are also not uncommon. The most sickly season at New Orleans is August. The births in that city in the year ending March 1808 were 456, the deaths 769. Snow seldom falls in this state, and frost is only experienced in December and January. In summer the thermometer sometimes rises to 93 in the shade. The mean temperature of spring water is said to be 65°. About the 1st of February peach and plum trees are in blossom. Louisiana || Louth.

The most considerable rivers are the Mississippi, which has generally a breadth of 880 yards in this state. Its depth near New Orleans exceeds 150 feet. The Red river falls into the Mississippi near Fort Adams. The Sabine river falls into the gulf of Mexico. The Lafourche, Atchafalaga, and Ibberville, are outlets of the Mississippi. There are also several lakes, of which those of Ponchartrain and Chetimache are the most considerable. Lake Borgne is an arm of the sea. By its rivers and lakes Louisiana enjoys an inland navigation of 4600 miles.

A mass of native iron weighing 3000 pounds was lately discovered on the banks of Red river. Iron ore, silver, alum, coal, and potter's earth, are found in the state. There are also salt springs at different places.

The constitution of this state was framed by a convention at New Orleans in 1812. The legislature consists of a senate chosen for four years, and house of representatives for two. All free white male citizens of 21 years of age, and paying taxes, are electors. The members of both houses receive four dollars a day for their services. The governor is elected for four years. The judges of all the courts hold their offices during good behaviour. The militia consists of all the free white citizens.

This country was invaded by a British force in December 1814. It advanced to within six miles of New Orleans, but was defeated there on the 8th January 1815, with the loss of its commander General Packenham and 2600 men in killed and wounded. The Americans, who were commanded by General Jackson, and fought behind an entrenchment, lost according to their own account, only 7 killed and 8 wounded.

Soon after Louisiana was ceded to the United States, there were two societies established for the promotion of science and literature, one of them at New Orleans, and another at Natchez. The former designs to publish a monthly magazine for the purpose of diffusing a knowledge of the country, and to amuse the readers of it with a variety of useful subjects. The latter, which was established in 1803, called the Mississippi Society for the Acquirement and Dissemination of useful Knowledge, consists of near 40 members, and has correspondents in various parts of the United States. The American government has granted it a charter of incorporation.

LOUSE. See PEDICULUS, ENTOMOLOGY *Index.*

LOUSY DISEASE. See MEDICINE *Index.*

LOUTH, a town of Lincolnshire in England, 156 miles from London. It is a town corporate, contained 4728 inhabitants in 1811, and has two weekly markets. Here are several handsome houses. From hence there is a canal to the sea at Tilney, about eight miles. Besides a charity school for 40 children, it has a free school founded by Edward VI. with a large church, and a fine steeple, which some think is as high as Grantham spire, which is 288 feet. Louth is 156 miles north from London.

LOUTH, a county in the eastern part of Ireland, which extends in the form of a bow or half-moon, on the

Louth, Louvain

the side of the ocean, being much longer than it is broad; it is bounded on the south and south-west by the county of East Meath, on the north-west by Monaghan, on the north by Armagh, and on the north-east by the bay of Carlingford, which parts it from the county of Down: it is watered by several small rivers; and its south frontiers are watered by the river Boyne. Its chief towns are Dundalk and Carlingford; unless we include Drogheda, a part whereof is in this county. It is the smallest county in the kingdom; but very fertile and pleasant, and abounding with many remains of antiquities, of which Mr Wright, in his Louthiana, has given a very ample description. It contains 111,180 Irish plantation acres, 50 parishes, five baronies, and five boroughs; and formerly returned 10 members to the Irish parliament: it is about 22 miles long, and 14 broad. See LOUTH, SUPPLEMENT.

LOUTH, a town in the above county, having a yearly fair.

LOUVAIN, a city in the kingdom of the Netherlands, in the province of Brabant, pleasantly seated on the river Dyle, in a plentiful and agreeable country. The walls are about eight or nine miles in circumference; but they include several fields and vineyards. The castle stands on a high hill, surrounded with fine gardens, and has a charming prospect all over the country. This town contains nine market places, 14 water-mills, 126 streets, 16 stone bridges, and several handsome palaces. The town-house is a venerable old building, adorned with statues on the outside; and the churches are very handsome, particularly the collegiate church of St Peter; but the principal ornament is the university, founded only in 1426 by John IV. duke of Brabant, with the concurrence of Pope Martin V. It contains about 40 colleges, four of which are called *Pedagogia*. There is in the number also an English college of friars-preachers, which owes its establishment to the liberalities of Cardinal Philip Howard, brother to the duke of Norfolk, who, before he was raised to the purple, had been private chaplain to Queen Catherine, consort to Charles II. The Irish have likewise a seminary, erected in part under the care of Eugenius Mattheus, titular archbishop of Dublin, anno 1623, which receives its appointments from the Propaganda at Rome. Besides the above, there are two convents for the Irish, one of Recollects and the other of Dominicans, where divinity and the mathesis are taught. In the last century the number of scholars exceeded 4000; but in the year 1744 the inhabitants amounted to 12,000, including 2000 students only.—At the beginning of the 14th century, under John III. it flourished considerably in the manufacture of woollen cloth: 400 houses were then occupied by substantial clothiers, who gave employment to an incredible number of weavers, so great, it is said, that a bell was rung to prevent any injuries which the children in the street might receive from the crowd and hurry on their returning from work. In 1382, these weavers, however, took up arms, and rebelled against their sovereign Prince Wenceslaus, throwing from the windows of the town hall 17 of the aldermen and counsellors, and afterwards proceeded to lay waste great part of Brabant; but being besieged and reduced to great extremities, they submissively implored his clemency; which was granted after the execution of some of the principal ringleaders. The weavers, the chief instigators to this revolt, were banished, the greater part of whom took refuge in England; where they first introduced, or at least augmented very much, the woollen manufacture. The town, by this circumstance, being almost depopulated, the university was established to supply in some measure the loss of the rebellious clothiers. Since that time the manufacture gradually declined, no cloth of any account being made there at present. This impolitic step of the duke Wenceslaus sent treasures to England, through the hands of those exiled people: an important lesson to governors, that they should deal with great precaution respecting such useful members of the community. Upon the ruins of these looms was formed the cloth manufacture of Limbourg, which is carried on with good advantage to this day. There is yet standing at Louvain part of the old drapers-hall, now converted into four public schools, where lectures in divinity, philosophy, law, and physic, are given, and the public acts are made. Adjoining to the schools is the university library which altogether compose a large pile of building. Over the door of the chief entrance we read these words, *Sapientia ædificavit sibi domum*. The principal church is collegiate, dedicated to St Peter, which had formerly three very large towers with elevated spires, one considerably higher than the two collaterals; these were blown down in the year recorded by this chronogram, *oMnIaCaDVnt*. From the name of this church, the burghers have acquired the nickname of *Petermen*, whose ancestors having clothed the back by a noble woollen manufacture, the modern Petermen now compose an ignoble mixture for the belly, called after them *Peterman beer*, a sort of whitish muddy ale, which they notwithstanding send in large quantities to all parts of the country, as well as to Holland, by the canals. Louvain was anciently the capital of the province, long before Brussels had any claim to that title. It was taken by the French in 1792, afterwards lost, and retaken in 1794. E. Long. 4. 40. N. Lat. 51. 12.

Louvain || Low-bell.

LOUYS, or LOUIS, *John*, an engraver of considerable eminence, who flourished about the middle of the 16th century. According to Basan he was a native of Flanders. He learned the art of engraving from Peter Soutman, at the time that Suyderhoef studied under the same master; and his usual style of engraving bears some resemblance to that of his master's. One of his best prints is Diana, with her nymphs, reposing after the chase; a middling-sized plate, lengthwise, from Rubens.

LOW-BELL, in birding, a name given to a bell, by means of which they take birds in the night, in open champaign countries, and among stubble, in October. The method is to go out about nine o'clock at night in a still evening, when the air is mild and the moon does not shine. The low-bell should be of a deep and hollow sound, and of such a size that a man may conveniently carry it in one hand. The person who carries it is to make it toll all the way he goes, as nearly as may be, in that manner in which the bell on the neck of a sheep tolls as it goes on and feeds. There must also be a box made like a large lanthorn, about a foot square, and lined with tin, but with one side open. Two or three great lights are to be set in this; and the box is to be fixed to the person's breast, with the open side forwards, so that the light may be cast forward to a great distance. It will spread as it goes

Low-bell || Lower.

goes out of the box; and will distinctly show to the person that carries it whatever there is in the large space of ground over which it extends, and consequently all the birds that roost upon the ground. Two persons must follow him who carries the box and bell, one on each side, so as not to be within the reach of the light to show themselves. Each of these is to have a hand-net, of about three or four feet square, fastened to a long stick or pole; and on whichever side any bird is seen at roost, the person who is nearest is to lay his net over it, and take it with as little noise as possible. When the net is over the bird, the person who laid it is not to be in a hurry to take the bird, but must stay till he who carries the light is got beyond it, that the motions may not be discovered. The blaze of the light and the noise of the bell terrify and amaze the birds in such a manner that they remain still to be taken; but the people who are about the work must keep the greatest quiet and stillness that may be.

Some people are fond of going on this scheme alone. The person then fixes the light box to his breast, and carries the bell in one hand and the net in the other; the net in this case may be somewhat smaller, and the handle shorter. When more than one are out at a time, it is always proper to carry a gun; as it is no uncommon thing to spy a hare when on this expedition.

LOW, East, a town of Cornwall in England, 231 miles from London, in the post road from Plymouth. It is an ancient borough by prescription, made a corporation by charter of Queen Elizabeth, consisting of nine burgesses (one of whom is yearly chosen mayor), a recorder, aldermen, &c.; and the mayor, magistrates, and freemen, who are about 68, choose the members of parliament. This being a manor of the duchy of Cornwall, was settled by King William on Lord Somers, and is now held by the corporation at the fee-farm rent of 20s. a-year. It is seated pretty commodiously on a creek of the sea, over which there is a large stone bridge, supported by 15 arches, which leads to West Low. The chief benefit which the inhabitants have is in their fishery. Here is a battery of four guns, and a small chapel. It contained 608 inhabitants in 1811.

Low, West, called also *Port Pigham*, a town of Cornwall, divided from East Low by a stone bridge of 15 arches over the river Low, from whence both towns receive their name, as the river does from the lowness of its current between its high banks. The corporation, by charter of Queen Elizabeth, consists of 12 burgesses, one of whom is annually chosen mayor, and, with the other burgesses, has power to choose a steward. Its members, whom it has sent to parliament ever since the 6th of Edward VI. are elected by the corporation and freemen, who are about 60. There was a chapel of ease here in the reign of Henry VIII. which was afterwards converted into a town-hall; and the town lying in the parish of Talland, the people go thither to church. There is a pretty little harbour here; near the mouth of which is a small island called *St George's*, which abounds with sea pies. The river here is navigable for vessels of 100 tons. Population in 1811, 433.

LOWER, Richard, an eminent English physician in the 17th century, was born in Cornwall, and educated at Westminster school and Oxford; after which he studied medicine, and practised under Dr Thomas Willis, whom he instructed in some parts of anatomy, especially when the latter was writing his *Cerebri Anatome*. He, with Dr Willis, in 1674, discovered the medicinal waters at Ashop in Northamptonshire; which, upon their recommendation, became very much frequented. In 1666, he followed Dr Willis to London; practised physic under him; and became fellow of the Royal Society, and of the College of Physicians. In 1669 he published his *Tractatus de Corde*; and after the death of Dr Willis in 1675, he was esteemed the most eminent physician in London. Upon the breaking out of the Popish plot in 1678, says Mr Wood in his *Athenæ Oxoniensis*, he closed with the Whigs, supposing that party would carry all before them; but, being mistaken, he lost his credit and practice. He died in 1691.

Lower || Low.

LOWERING, among distillers, a term used to express the debasing the strength of any spirituous liquor, by mixing water with it. The standard and marketable price of these liquors is fixed in regard to a certain strength in them called *proof*; this is that strength which makes them, when shaken in a phial or poured from on high into a glass, retain a froth or crown of bubbles for some time. In this state, spirits consist of about half pure or totally inflammable spirit, and half water; and if any foreign or home spirits are to be exposed to sale, and are found to have that proof wanting, scarce any body will buy it till it has been distilled again and brought to that strength; and if it is above that strength, the proprietor usually adds water to it to bring it down to that standard. See the article Proof.

There is another kind of lowering among the retailers of spirituous liquors to the vulgar, by reducing it under the standard proof. Whoever has the art of doing this without destroying the bubble proof, which is easily done by means of some addition that gives a greater tenacity to the parts of the spirits, will deceive all that judge by this proof alone. In this case, the best way to judge of liquors is by the eye and tongue, and especially by the instrument called Hydrometer.

LOWTH, William, D. D. a learned divine, born at London in 1661, was the son of an apothecary, and took his degrees at Oxford. His eminent worth and learning recommended him to Dr Mew bishop of Winchester, who made him his chaplain, gave him two livings in Hampshire, and conferred on him a prebend in the cathedral of Winchester. He acquired an unusual share of critical learning. Thus situated in life, the labours of Mr Lowth appear to have been strictly confined within the limits of his own province, and applied solely to the peculiar duties of his functions; yet, in order that he might acquit himself the better in theology, he had pursued his studies with a more general and extensive view. Few were more deeply versed in critical learning; there being scarcely any ancient author, Greek or Latin, profane or ecclesiastical, especially the latter, but what he had read with accuracy, constantly accompanying his reading with critical and philological remarks. Of his collections in this way he was upon all occasions very communicative. Hence his notes on *Clemens Alexandrinus*, which are to be met with in Potter's edition of that father. Hence his remarks on *Josephus*, communicated

Lowth. municated to Hudson for his edition, and acknowledged in the preface; as also those larger and more numerous annotations on the Ecclesiastical Historians, inserted in *Reading's* edition of them at Cambridge. The author of *Bibliotheca Biblica* was indebted to him for the same kind of assistance. Chandler, late bishop of Durham, while engaged in his "Defence of Christianity, from the Prophecies of the Old Testament, against the Discourse of the Grounds and Reasons of the Christian Religion," and in his "Vindication of the Defence, in answer to The Scheme of Literal Prophecy considered," held a constant correspondence with him, and consulted him upon many difficulties that occurred in the course of that work. The most valuable part of his character was that which least appeared in the eyes of the world, the private and retired part, that of the good Christian and the useful parish priest. His piety, his diligence, his hospitality and beneficence, rendered his life highly exemplary, and greatly enforced his public exhortations. He married Margaret, daughter of Robert Pitt, Esq. of Blandford, by whom he had two sons and three daughters. (See the next article). He died in 1732, and was buried by his own orders in the churchyard of Buriton. He published, 1. A Vindication of the Divine Authority and Inspiration of the Old and New Testaments; 2. Directions for the profitable reading of the Holy Scriptures; 3. Commentaries on the Prophets; and other works.

LOWTH, *Robert*, D. D. second son of the preceding Dr William Lowth, and bishop successively of St David's, Oxford, and London, was born on the 29th of November 1710, probably at Buriton in the county of Hants. He received the rudiments of his education at Winchester college, where his school exercises were distinguished by uncommon elegance; and having resided the requisite number of years in that seminary, in 1730 he succeeded on the foundation at New College, Oxford. He took the degree of M. A. June 8. 1737. Though his abilities must have been known to those with whom he was connected, he was not forward to appear before the world as a writer. At Oxford he continued many years improving his talents, with little notice from the great, and with preferment so small as to have at present escaped the distinct recollection of some of his contemporaries.

He was not, however, suffered to languish for ever in obscurity. His genius and his learning forced themselves upon the notice of the illustrious society of which he was a member; and he was placed in a station where he was eminently qualified to shine. In 1741 he was elected by the university to the professorship of poetry, re-elected in 1743, and whilst he held that office he read his admirable lectures *De sacra poesi Hebræorum*. In 1744 Bishop Hoadley collated him to the rectory of Ovington in the county of Hants; added to it, nine years afterwards, the rectory of East Weedhay in the same county; and in the interim raised him to the dignity of archdeacon of Winchester. These repeated favours he some years afterwards acknowledged in the following manly and respectful terms of gratitude: "This address, my Lord, is not more necessary on account of the subject, than it is in respect of the author. Your Lordship, unsolicited and unasked, called him from one of those colleges to a station of the first dignity in your diocese, and took the earliest opportunity of accumulating your favour upon him, and of adding to that dignity a suitable support. These obligations he is now the more ready thus publicly to acknowledge, as he is removed out of the reach of further favours of the like kind. And though he hath relinquished the advantages so generously conferred on him, yet he shall always esteem himself highly honoured in having once enjoyed the patronage of the great advocate of civil and religious liberty." Lowth.

On the 8th of July 1754 the university of Oxford conferred upon him the degree of D. D. by diploma; an honour which, as it is never granted but to distinguished merit, was probably conferred on Mr Lowth in consequence of his prelections on the Hebrew poetry, which had then been lately published. Having in 1749 travelled with Lord George and Lord Frederick Cavendish, he had a claim upon the patronage of the Devonshire family; and in 1755, the late duke being then lord lieutenant of Ireland, Dr Lowth went to that kingdom as his grace's first chaplain. Soon after this appointment he was offered the bishopric of Limerick; but preferring a less dignified station in his own country, he exchanged it with Dr Leslie, prebendary of Durham and rector of Sedgefield, for these preferments. In November 1765 he was chosen F. R. S. In June 1766 he was, on the death of Dr Squire, preferred to the bishopric of St David's; which, in the October following, he resigned for that of Oxford, vacant by the translation of Bishop Hume to Salisbury. In April 1777, he was translated to the see of London, vacant by the death of Bishop Terrick; and in 1783 he declined the offer of the primacy of all England.

Having been long afflicted with the stone, and having long borne the severest sufferings of pain and sickness with the most exemplary fortitude and resignation, this great and good man died at Fulham, Nov. 3. 1787; and on the 12th his remains were privately interred in a vault at Fulham church, near those of his predecessor. He had married in 1752, Mary, the daughter of Laurence Jackson of Christ-church, Hants, Esq. by whom he had two sons and five daughters. His lady and two children only survived him.

His literary character may be estimated from the value and the importance of his works; in the account of which we may begin with his *Prelections on the Hebrew Poetry*. The choice of so interesting a subject naturally attracted general attention; and the work has been read with equal applause abroad and at home. In these Prelections the author has acquitted himself in the most masterly manner, as a poet, a critic, and a divine; and such is the classic purity of his Latin style, that though we have read the work with the closest attention, and with no other view than to discover, if possible, an Anglicism in the composition, we never found a single phrase to which, we believe, a critic of the Augustan age could possibly have objected. This is an excellence to which neither Milton nor Johnson has attained; to which indeed no other English writer of Latin with whom we are acquainted has attained, unless perhaps Atterbury must be excepted. To the Prelections was subjoined a short confutation of Bishop Hare's system of Hebrew metre; which occasioned a Latin letter from Dr Edwards of

Lowth. Clare-hall, Cambridge, to Dr Lowth, in vindication of the Harian metre. To this the author of the prelections replied in a *larger confutation*, in which Bishop Hare's system is completely overthrown, and the fallacy upon which it was built accurately investigated. After much attentive consideration, Bishop Lowth has pronounced the metre of the Hebrews to be perfectly irrecoverable.

In 1758 he published *The life of William of Wykeham, bishop of Winchester*, with a dedication to Bishop Hoadley; which involved him in a dispute concerning a decision which that bishop had lately made respecting the wardenship of Winchester-college. This controversy was on both sides carried on with such abilities, that, though relating to a private concern, it may yet be read, if not with pleasure, at least with improvement. The life of Wykeham is drawn from the most authentic sources; and affords much information concerning the manners, and some of the public transactions of the period in which Wykeham lived, whilst it displays some private intelligence respecting the two literary societies of which he was the founder. In these two societies Dr Lowth was educated, and he gratefully expresses his obligations to them.

In 1762 was first published his *Short Introduction to English Grammar*, which has since gone through many editions. It was originally designed only for private and domestic use: but its judicious remarks being too valuable to be confined to a few, the book was given to the world; and the excellence of its method, which teaches what is right by showing what is wrong, has insured public approbation and very general use. In 1765 Dr Lowth was engaged with Bishop Warburton in a controversy, which made much noise at the time, which attracted the notice even of royalty, and of which the memory is still recent. If we do not wish to dwell on the particulars of this controversy, it is because violent literary contention is an evil, which though like other war it may sometimes be unavoidable, is yet always to be regretted; and because the characters of learned, ingenious, and amiable men, never appear to less advantage than under the form which that state of hostility obliges them to assume. The two combatants indeed engaged with erudition and ingenuity, such as is seldom brought into conflict; but it appears that, in the opinion of Dr Johnson, Warburton had the most scholastic learning, and that Lowth was the most correct scholar; that, in their contest with each other, neither of them had much argument, and that both were extremely abusive. We have heard, and we hope it is true, that they were afterwards reconciled, and expressed mutual regret for the violence of their past conduct.

In 1778 Bishop Lowth published his last great work, *A Translation of Isaiah*. To his literary and theological abilities, the translator joined the most critical knowledge of the character and spirit of the eastern poetry; and, accordingly, the prophecies of Isaiah (which, though almost always sublime or elegant, are yet sometimes obscure) were translated in a manner adequate to the highest expectations of the public. Several occasional discourses, which the bishop, by his station, was at different times called upon to deliver, were of course published, and are all worthy of their excellent author; but there is one on the *kingdom of God*, on the extension and progressive improvement of Christ's religion, and on the means of promoting these by the advancement of religious knowledge, by freedom of inquiry, by toleration, and mutual charity, which may be distinguished above the rest, as exhibiting a most comprehensive view of the successive states of the Christian church, and containing the truest principles of Christianity. Lowth.

Of the bishop's poetical pieces, none display greater merit than Verses on the Genealogy of Christ, and the Choice of Hercules, both written very early in his life. He wrote a spirited Imitation of an Ode of Horace, applied to the alarming situation of this country in 1745; and likewise some verses on the death of Frederic prince of Wales, with a few smaller poems. The following inscription on the tomb of his daughter, beautifully displays his paternal affection and classic taste. As it is short, and, in our opinion, has all the merit of the ancient epitaph, the reader will probably be pleased with such a specimen of his lordship's Latinity.

Cara, vale, ingenio præstans, pietate, pudore,
Et plusquam natæ nomine cara, vale.
Cara Maria, vale. At veniet felicius ævum,
Quando iterum tecum, sim modo dignus, ero.
Cara, redi, læta tum dicam voce, paternos,
Eja, age in amplexus, cara Maria, redi.

Learning and taste, however, did not constitute Bishop Lowth's highest excellence. Eulogium itself can scarcely ascend to extravagance when speaking of him either as a private man, or as a pastor of the church of Christ. His amiable manners rendered him an ornament to his high station, whilst they endeared him to all with whom he conversed; and his zeal for the interests of true religion made him eager to promote to places of trust and dignity such clergymen as he knew were best qualified to fill them. Of his modesty, gentleness, and pleasing conversation, we have the testimony of one whose decision will hardly be disputed.—"It would answer no end (says Bishop Warburton) to tell you what I thought of the author of Hebrew poetry, before I saw him. But this I may say, I was never more surprised, when I did see him, than to find him of such amiable and gentle manners, of so modest, sensible, and disengaged a deportment." He united, indeed, in an eminent degree, the qualities of the gentleman with those of the scholar: he conversed with elegance, as he wrote with accuracy. As a husband, a father, or the master of a family, he was as nearly faultless as the imperfections of humanity will easily permit. His temper, when roused by what he thought improper conduct was indeed susceptible of considerable warmth; but if he could be highly offended, upon a slight concession he could likewise forgive. His heart was tender and sympathetic. He possessed a mind which felt its own strength, and decided on whatever came before it with promptitude and firmness. In those trials where affliction was to be suffered or subdued, he behaved as a man and a Christian. His piety had no tincture of moroseness; his charity no leaven of ostentation. To his whole diocese he was endeared by his laudable discretion and his useful zeal. To the world he was a benefit by his exemplary life and his splendid abilities. And whilst virtue and learning are

revereneed

Lowth || Lubec.

reverenced among men, the memory of Lowth will be respected and admired.

LOXIA, a genus of birds of the order of passeres. See ORNITHOLOGY *Index*.

LOYOLA, IGNATIUS. See IGNATIUS.

LOZENGE, in *Heraldry*, a four-cornered figure, resembling a pane of glass in old casements. See HERALDRY. Though all heralds agree that single ladies are to place their arms on lozenges, yet they differ with respect to the causes that gave rise to it. Plutarch says, in the life of Theseus, that in Megara, an ancient town of Greece, the tomb-stones under which the bodies of the Amazons lay, were shaped after that form; which some conjecture to be the cause why ladies have their arms on lozenges. *S. Petra Sancta* will have this shield to represent a *cushion*, whereupon women used to sit and spin, or do other housewifery. Sir J. Ferne thinks it is formed from the shield called *tessera*, which the Romans finding unfit for war, did allow to women to place their ensigns upon, with one of its angles always uppermost.

LOZENGES, among jewellers, are common to brilliant and rose diamonds. In brilliants, they are formed by the meeting of the skill and star facets on the bezil; in the latter, by the meeting of the facets in the horizontal ribs of the crown. See FACETS.

LOZENGE is also a form of medicine, made into small pieces, to be held or chewed in the mouth till they are melted there: the same with what are otherwise called *trochisci*, "troches."

LUBEC, a city and port-town of Germany, in the circle of Lower Saxony and duchy of Holstein, in E. Long. 10. 50. N. Lat. 53. 55. It stands at the conflux of several rivers, the largest of which is the Trave, 12 miles from the Baltic, where it has a fine harbour, and 40 north-east of Hamburgh. By the Steckenitz, another of those rivers, it has a communication with the Elbe, and consequently with the German ocean. The city lies on the side of a hill, with the Trave, increased by the Steckenitz on the one side, and the Wakenitz on the other; and is strongly fortified with bastions, moats, walls, and ramparts; the last of which are planted with trees, and form an agreeable walk. Lubec being formerly the chief of the Hanse towns, was very powerful in consequence of the vast trade carried on; but a great part of that trade is now transferred to Hamburgh; however, it is still said to employ 150 of its own ships, and has a great share of the Baltic trade. It is about two miles in length, and more than one in breadth. The houses are all of stone, but old fashioned. Several of the streets have on each side rows of lime trees, with canals in the middle, like those of Holland. The public structures consist of the ancient cathedral of the bishopric of Lubec, and several other Lutheran churches; a nunnery for 22 ladies, with an abbess and prioress; a poor-house, an alms-house, and house of correction; an orphan-house; an hospital dedicated to the Holy Ghost; a house in which poor travellers are entertained three days, and then sent forward with a pass; the city armoury, a grammar-school of seven classes, the Calvinist church, and the Popish chapel. The deputies of the Hanse-towns used to meet here formerly in the townhouse. An alliance still subsists between Lubec, Hamburgh, and Bremen; and these cities, under the name of *Hanse Towns*, negociate treaties with foreign powers. Here are divers manufactures, and the city's territory is about 60 miles in compass. In the diet of the empire Lubec is possessed of the third seat among the Rhenish imperial cities; and among those of the circle, has the first. In the matricula, its assessment is 480 florins, and to the chamber of Wetzlar it pays 557 rix-dollars and 88 kruitzers. The city is a republic within itself, and both makes and executes laws in regard to civil and criminal matters, &c. A father and son, or two brothers, cannot be in the regency at the same time. The famous league of the Hanse-towns was begun here in 1164. This city had its charter of privileges from the emperor Frederic II. Formerly it carried on wars, both offensive and defensive, for several years, not only against the dukes of Mecklenburg, but against the kings of Sweden and Denmark; particularly in 1428, when it fitted out 250 ships of force against Eric X. king of Denmark. There are about 20 churches in Lubec, with lofty steeples or spires. The Trave brings ships of burden into the very heart of the city; but the largest unload at Travemunde, i. e. the mouth of the Trave, eight or ten miles distant. Formerly it is said to have employed no less than 600 ships, but its trade is now greatly reduced. In the famous cellar here, it is said, there is wine 200 years old. The town's garrison consists of about 700 or 800 men. The revenue of its Lutheran bishop, though he is a prince of the empire, is said not to exceed 3000l. Lubec fell into the hands of the French in 1806, when Bonaparte overran the Prussian dominions; and many of the inhabitants were cruelly massacred and plundered; but it has since been restored to its rank as a free city. The population is 42,000.

Lubec || Lubin.

LUBEN, a town of Germany, in the marquisate of Lower Lusatia. It is situated on the river Spree, and is the capital of a small circle of the same name. It is the seat of the diets, and of the chief tribunals and offices; and has several churches, with a noble land-house and hospital. E. Long. 14. 25. N. Lat. 52.

LUBIENIETSKI, STANISLAUS, a Polish gentleman, descended from a noble family, and born at Cracow in 1623, was educated by his father with great attention. He became a celebrated Socinian minister; and took great pains to obtain a toleration from the German princes for his Socinian brethren. His labours, however, were ineffectual; being himself persecuted by the Lutheran ministers, and banished from place to place; until at length he was banished out of the world, with his two daughters, by poison, his wife narrowly escaping, in 1675. We have of his writing A History of the Reformation in Poland; A Treatise on Comets; with other works, in Latin.

LUBIN, EILHARD, was professor of poetry in the university of Rostock in 1595; and ten years afterwards was promoted to the professorship of divinity. He wrote notes on Anacreon, Juvenal, Persius, &c. and several other works; but that which made the most noise is a treatise on the nature and origin of evil, entitled *Phosphorus de Causa prima et Natura Mali*, printed at Rostock in 1596; in which we have a curious hypothesis to account for the origin of moral evil.

Lubin || Lucanus.

He supposed two co-eternal principles, not *matter* and *vacuum*, as Epicurus did; but God, and *Nihilum* or *Nothing*. This being published against by Grawer, was defended by Lubin; but after all he is deemed better acquainted with polite literature than with divinity. He died in 1621.

LUBLIN, a handsome and considerable town of Poland, capital of the palatinate of the same name, with a citadel, a bishop's see, an university, and a handsome Jewish synagogue. Here the judicial courts for all Poland were held. It has three fairs, frequented by merchants from all nations. It is seated on the river Bystrzna. E. Long. 22. 31. N. Lat. 51. 26.

LUCA, in *Ancient Geography*, a town of Etruria, on the river Aufer; a colony and a municipium. Now *Lucca*, capital of the republic of that name, near the river Sechia. E. Long. 11. 20. N. Lat. 43. 45.

LUCANIA, a country of Italy, and a part of Magna Græcia; bounded on the north by the river Silarus by which it was separated from the Picentini, and by the river Bradanus by which it was parted from the Apuli Peucetii; on the south by the Laüs, which separated it from the Bruttii; on the east by the Sinus Tarentinus; and on the west by the Tuscan sea. *Lucani*, the people, descendants of the Samnites. *Lucanus* the epithet, (Horace.) *Lucanæ boves* denoted elephants; first seen in Pyrrhus's wars in Lucania, whence the appellation (Pliny.)

LUCANUS, Marcus Annæus, a Latin poet, born at Corduba in Spain, about A. C. 39. He was the son of Annæus Mela, the youngest brother of Seneca; and was conveyed to Rome from the place of his nativity at the age of eight months; a circumstance, as his more indulgent critics observe, which sufficiently refutes the censure of those who consider his language as provincial. At Rome he was educated under the Stoic Cornutus, so warmly celebrated by his disciple Persius the satirist, who was the intimate friend of our poet. In the close of his education, Lucan is said to have passed some time at Athens. On his return to Rome he rose to the office of quæstor, before he had attained the legal age. He was afterwards enrolled among the augurs; and married a lady of noble birth, and of a most amiable character. Lucan had for some time been admitted to familiarity with Nero, when the emperor chose to contend for poetical honours by the public recital of a poem he had composed on Niobe; and some verses of his imperial production are supposed to be preserved in the first satire of Persius. Lucan had the hardiness to repeat a poem on Orpheus, in competition with that of Nero; and, what is more remarkable, the judges of the contest were just and bold enough to decide against the emperor. From hence Nero became the persecutor of his successful rival, and forbade him to produce any poetry in public. The well known conspiracy of Piso against the tyrant soon followed; and Tacitus, with his usual sarcastic severity, concludes that Lucan engaged in the enterprise from the poetical injuries he had received: "a remark (says Mr Hayley *, who has endeavoured to refute the imputation) which does little credit to the candour of the historian; who might have found a much nobler, and, I will add, a more probable motive for his conduct, in the generous ardour of his character, and his passionate adoration of freedom. In the sequel of his narration, Tacitus alleges a charge against our poet, which, if it were true, must lead us to detest him as the most abject of mankind. The historian asserts, that Lucan, when accused of the conspiracy, for some time denied the charge; but corrupted at last by a promise of impunity, and desirous to atone for the tardiness of his confession, accused his mother Atilla as his accomplice. This circumstance is so improbable in itself, and so little consonant to the general character of Lucan, that some writers have treated it with contempt, as a calumny invented by Nero, to vilify the object of his envious abhorrence. But the name of Tacitus has given such an air of authority to the story, that it may seem to deserve a more serious discussion, particularly as there are two subsequent events related by the same historian, which have a tendency to invalidate the accusation so injurious to our poet. The events I mean are, the fate of Annæus, and the escape of Atilla, the two parents of Lucan. The former died in consequence of an accusation brought against him, after the death of his son, by Fabius Romanus, who had been an intimate with Lucan, and forged some letters in his name, with the design of proving his father concerned in the conspiracy. These letters were produced to Nero, who sent them to Annæus, from an eager desire, says Tacitus, to get possession of his wealth. From this fact two inferences may be drawn, according to the different lights in which it may be considered:—If the accusation against Annæus was just, it is clear that Lucan had not betrayed his father, and he appears the less likely to have endangered by his confession the life of a parent, to whom he owed a still tenderer regard:—If Annæus was not involved in the conspiracy, and merely put to death by Nero for the sake of his treasure, we may the more readily believe, that the tyrant who murdered the father from avarice, might calumniate the son from envy. But the escape of Atilla affords us the strongest reason to conclude that Lucan was perfectly innocent of the abject and unnatural treachery of which Tacitus has supposed him guilty. Had the poet really named his mother as an accomplice, would the vindictive and sanguinary Nero have spared the life of a woman whose family he detested, particularly when other females were put to death for their share in the conspiracy? That Atilla was not in that number, the historian himself informs us in the following remarkable sentence, "Atilla mater Annæi Lucani, sine absolutione, sine supplicio, dissimulata;" thus translated by Gordon: "The information against Atilla, the mother of Lucan, was dissembled; and, without being cleared, she escaped unpunished."

Lucanus.

The preceding remarks will, our author hopes, vindicate to every candid mind the honour of Lucan, whose firmness and intrepidity of character are indeed very forcibly displayed in that picture of his death which Tacitus himself has given us. He was condemned to have his veins cut, as his uncle Seneca had before him. Lucan, "while his blood issued in streams, perceiving his feet and hands to grow cold and stiffen, and life to retire by little and little from the extremities, while his heart was still beating with vital warmth, and his faculties nowise impaired, recollected some lines of his own, which described a wounded soldier expiring in a manner that resembled this. The lines themselves he rehearsed; and they were the last words he

* In the *Notes* to his *Second Epistle* on *Epic Poetry*.

Lucanus. he ever uttered." The critics differ concerning the verses of the Pharsalia which the author quoted in so memorable a manner. The two passages he is supposed to have repeated are the following; of which Lipsius contends for the latter.

Sanguis erant lachrymæ: quæcunque foramina nova
Humor, ab his largus manat cruor: ora redundant,
Et patulæ nares: sudor rubet: omnia plenis
Membra fluunt venis: totum est pro vulnere corpus.
Lib. ix. v. 814.

Now the warm blood at once, from every part
Ran purple poison down, and drain'd the fainting heart.
Blood falls for tears; and o'er his mournful face
The ruddy drops their tainted passage trace.
Where'er the liquid juices find a way,
There streams of blood, their crimson rivers stray,
His mouth and gushing nostrils pour a flood,
And e'en the pores ooze out the trickling blood;
In the red deluge all the parts lie drown'd,
And the whole body seems one bleeding wound. ROWE.

Scinditur avulsus; nec sicut vulnere sanguis
Emicuit lentus; ruptis cadit undique venis,
Discursusque animæ, diversa in membra meantis,
Interceptus aquis. Lib. iii. v. 638.

No single wound the gaping rupture seems,
Where trickling crimson wells in slender streams;
But, from an op'ning horrible and wide,
A thousand vessels pour the bursting tide:
At once the winding channel's course was broke, Lucanus.
Where wand'ring life her mazy journey took;
At once the currents all forgot their way,
And lost their purple in the azure sea. ROWE.

Such was the death of Lucan before he had completed his 27th year.—His wife, Polla Argentaria, is said to have transcribed and corrected the three first books of the Pharsalia after his death. It is much to be regretted (Mr Hayley observes) that we possess not the poem which he wrote on the merits of this amiable and accomplished woman; but her name is immortalized by two surviving poets of that age. The veneration which she paid to the memory of her husband is recorded by Martial; and more poetically described in that pleasing and elegant little production of Statius, *Genethliacon Lucani*, a poem said to have been written at the request of Argentaria. The author, after invoking the poetical deities to attend the ceremony, touches with great delicacy and spirit on the compositions of Lucan's childhood, which are lost, and the Pharsalia, the production of his early youth: he then pays a short compliment to the beauty and talents of Argentaria; laments the cruel fate which deprived her so immaturely of domestic happiness; and concludes with an address to the shade of Lucan, which, with Mr Hayley's translation, we shall subjoin in a Note, as it seems to furnish a strong presumption of Lucan's innocence in regard to one of the accusations mentioned above (A). "Had he been really guilty of basely endangering

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(A) At tu, seu rapidum poli per axem
Famæ curribus arduis levatus,
Qua surgunt animæ potentiores,
Terras despicis et sepulchra rides:
Seu pacis meritum nemus reclusæ
Felix Elysiis tenes in oris,
Quo Pharsalica turba congregatur;
Et te nobile carmen insonantem
Pompeii comitantur et Catones:
Tu magna sacer et superbus umbra
Nescis Tartaron, et procul nocentum
Audis verbera, pallidumque visa
Matris lampade respicis Neronem.
Adsis lucidus; et vocante Polla
Unam, quæso, diem deos silentum
Exores; solet hoc patere limen
Ad nuptas redeuntibus maritis.
Hæc te non thiasis procax dolosis
Falsi numinis induit figuras;
Ipsum sed colit, et frequentat ipsum
Imis altius insitum medullis;
Ac solatia vana subministrat
Vultus, qui simili notatus, auro
Stratis prænitet, excubatque somno
Securæ. Procul hinc abite mortes;
Hæc vitæ genitalis est origo;
Cedat luctus atrox, genisque manent
Jam dulces lachrymæ, dolorque festus
Quicquid fleverat ante nunc adoret.

But you, O! whether to the skies
On Fame's triumphant car you rise,
(Where mightier souls new life assume)
And mock the confines of the tomb;
Or whether in Elysium blest
You grace the groves of sacred rest,
Where the Pharsalian heroes dwell;
And, as you strike your epic shell,
The Pompeys and the Catos throng
To catch the animating song;
Of Tartarus the dread controul
Binds not your high and hallow'd soul:
Distant you hear that wailing coast,
And see the guilty Nero's ghost
Grow pale with anguish and affright,
His mother flashing on his sight.
Be present to your Polla's vows,
While to your honour'd name she bows!
One day let your entreaties gain
From those who rule the shadowy train!
Their gates have op'd to bless a wife,
And given a husband back to life.
In you the tender fair invites
No fancied god with frantic rites:
You are the object of her prayers,
You in her inmost heart she bears:
And stampt on mimic gold, your head
Adorns the faithful mourner's bed,
And soothes her eyes before they close,
The guardian of her chaste repose.
Away with all funereal state!
From hence his nobler life we date:
Let mourning change the pang severe,
To fond devotion's grateful tear!
And festal grief, its anguish o'er,
What it lamented, now adore!

Lucanus || Lucaria.

endangering the life of his mother (says Mr Hayley), it is not probable that his wife would have honoured his memory with such enthusiastic veneration; or that Statius, in verses designed to do him honour, would have alluded to *the mother* of Nero. If his character as a man has been injured by the historian (continues Mr Hayley), his poetical reputation has been treated not less injuriously by the critics. Quintilian, by a frivolous distinction, disputes his title to be classed among the poets; and Scaliger says, with a brutality of language disgraceful only to himself, that he seems rather to *bark* than to *sing*. But these insults may appear amply compensated, when we remember, that in the most polished nation of modern Europe, the most elevated and poetic spirits have been his warmest admirers; that in France he was idolized by Corneille, and in England translated by Rowe.—The severest censures on Lucan have proceeded from those who have unfairly compared his language to that of Virgil: but how unjust and absurd is such a comparison! It is comparing an uneven block of porphyry, taken rough from the quarry, to the most beautiful superficies of polished marble. How differently should we think of Virgil as a poet, if we possessed only the verses which he wrote at that period of life when Lucan composed his Pharsalia! In the disposition of his subject, in the propriety and elegance of diction, he is undoubtedly far inferior to Virgil; but if we attend to the bold originality of his design, and to the vigour of his sentiments; if we consider the Pharsalia as the rapid and uncorrected sketch of a young poet, executed in an age when the spirit of his countrymen was broken, and their taste in literature corrupted; it may justly be esteemed as one of the most noble and most wonderful productions of the human mind.—Lucan wrote several poems; but we have none remaining beside his *Pharsalia*, of which an excellent English version has been given by Mr Nicholas Rowe.

LUCANUS, the *Stag-Beetle*, a genus of insects of the order of coleoptera. See ENTOMOLOGY *Index*.

LUCAR DE BARAMEDA (St), a handsome and considerable town of Spain, with a very good harbour, well defended, in Andalusia. It was once the greatest port in Spain, before the galleons unloaded their treasure at Cadiz. It is seated at the mouth of the river Guadalquiver. W. Long. 6. 5. N. Lat. 36. 40.

LUCAR de Guadiana (St), a strong town of Spain, in Andalusia, on the confines of Algarve; seated on the river Guadiana, with a little harbour. W. Long. 5. 59. N. Lat. 37. 32.

LUCAR de Major (St), a small town of Spain, in Andalusia, with the title of a duchy. It is seated on the river Guadiana, in W. Long. 6. 32. N. Lat. 37. 21.

LUCARIA, a feast celebrated at Rome on the 18th of July, in memory of the flight of the Romans into a great wood, where they found an asylum, and saved themselves from destruction. This wood, in which they found protection, was situated between the Tyber and the *Via Salaria*. The enemies from whom the Romans fled were the Gauls.—On this festival, Plutarch tells us, it was customary to pay the actors, and such as contributed to the public amusement, with the money arising from the felling of wood. This money was called *lucar*. It is obvious, from what has been observed, that *lucar* and *lucaria* are derived from *lucus*, a grove.

Lucaria, Lucas.

LUCAS JACOBS, an eminent artist, more generally known by the name of *Lucas van* LEYDEN, or *Hugense*, was born at Leyden in 1494. He received his first instructions in the art of painting from his father Hugues Jacobs; but completed his studies in the school of Cornelius Engelbrecht. He gained much money by his profession; and being of a generous turn of mind, he spent it freely, dressed well, and lived in a superior style. It is said, that, a few years before his death, he made a tour into Zealand and Brabant; and during his journey, a painter of Flushing, envious of his great abilities, gave him poison at an entertainment; which, though very slow, was too fatal in its effect, and put an end to his life, after six years languishing under its cruel influence. Others, denying the story of the poison, attribute his death to his incessant industry. The superiority of this artist's genius manifested itself in his infancy: for his works, even from the age of nine, were so excellent as to excite the admiration of all cotemporary artists; and when he was about 15, he painted a St Hubert, which gained him great applause. His tone of colouring (Mr Pilkington observes) is good; his attitudes (making a reasonable allowance for the stiff German taste) are well chosen; his figures have a considerable expression in their faces, and his pictures are very highly finished. He endeavoured to proportion the strength of his colouring to the different degrees of distance in which his objects were placed: for in that early time, the true principles of perspective were but little known, and the practice of it was much less observed. In the town hall at Leyden, the most capital picture of Lucas, the subject of which is the Last Judgment, is preserved with great care; the magistrates having refused very large sums which have been offered for it.

This artist painted not only in oil, but also in distemper and upon glass. Nor was he less eminent for his engraving than for his painting. He carried on a familiar and friendly correspondence with Albert Durer, who was his cotemporary; and, it is said, that as regularly as Albert Durer published one print, Lucas published another, without the least jealousy on either side, or wish to depreciate each other's merit. And when Albert came into Holland upon his travels, he was received by Lucas in a most cordial and affectionate manner. His style of engraving, however, according to Mr Strutt, differed considerably from that of Albert Durer, "and seems evidently to have been founded upon the works of Israel van Mechlen. His prints are very neat and clear, but without any powerful effect. The strokes are as fine and delicate upon the objects in the front, as upon those in the distances; and this want of variety, joined with the feebleness of the masses of shadow, give his engravings, with all their neatness, an unfinished appearance, much unlike the firm substantial effects which we find in the works of Albert Durer. He was attentive to the minutiæ of his art. Every thing is carefully made out in his prints, and no part of them is neglected. He gave great character and expression to the heads of his figures; but on examination of his works, we find the same

Lucas. heads too often repeated. The hands and feet are rather mannered than correct; and when he attempted to draw the naked figure, he succeeded but very indifferently. He affected to make the folds of his draperies long and flowing; but his female figures are frequently so excessively loaded with girdles, bandages, and other ornamental trappings, that much of the elegance of the design is lost. He engraved on wood, as well as on copper; but his works on the former are by no means numerous. They are, however, very spirited; though not equal, upon the whole, to those of his friend Albert. The prints of this master are pretty numerous, but very seldom met with complete; especially fine impressions of them. For though they are, generally speaking, executed with the graver only, yet, from the delicacy of the execution, they soon suffered in the printing. Of his engravings the few following may be mentioned as among the principal. 1. *Mahomet sleeping, with a priest murdered by his side, and another figure stealing his sword*, a middling-sized upright plate, dated 1508, said to be one of his most early productions. 2. An *ecce homo*, a large plate, lengthwise, dated 1510. 3. *The crucifixion on Mount Calvary*, the same. 4. *The wise men's offering*, the same, dated 1513. 5. *Return of the prodigal son*, a middling-sized plate, lengthwise, dated 1518. 6. A large print, lengthwise, called *the dance of Magdalen*, dated 1519. 7. His own *portrait*, a small upright plate, dated 1525. 8. *David playing before Saul*, a middling-sized upright plate, dated ———. This is a very fine print; the expression of Saul's countenance, in particular, is admirable. 9. A print known by the name of *Ulespiegle*, which is the scarcest of all the works of this master. It is in the collection of the king of France; and said by Marolles, and other masters, to be unique. But Basan informs us, that M. Mariette had also an impression of this plate; and it has been since found in one or two other collections. It represents a travelling bagpiper with his family; himself playing as he goes along, and carrying two children in a basket at his back; his wife trudging by his side, supporting with one hand an infant on her shoulder, and with the other leading an ass loaded with two baskets, having two children in each; and another child going before, with a little dog, completes the singular groupe. This rare print is dated 1520, and is known to have been sold for 16 louis d'ors.—It is nearly $7\frac{1}{2}$ inches high by $4\frac{1}{4}$ broad; and has been twice copied. One of the copies is the reverse way: but the other is the same way with the original; and, though not so well executed, might without a comparison be mistaken for it.

Lucas, *Richard*, D. D. a learned English divine, was born in 1648, and studied at Oxford; after which he entered into holy orders, and was for some time master of the free school at Abergavenny. Being esteemed an excellent preacher, he became vicar of St Stephen's, Coleman street, in London, and lecturer of St Olave's in Southwark. He was doctor of divinity; and in 1696 was installed prebendary of Westminster. His sight began to fail him in his youth; and he totally lost it in his middle age. He was greatly esteemed for his piety and learning; and published several works, particularly, 1. Practical Christianity. 2. An Inquiry after Happiness. 3. Several sermons. 4. A Latin translation of the Whole Duty of Man. He died in 1715. Lucas ‖ Lucerne.

LUCCA, a small republic of Italy, on the coast of the Mediterranean, between the territory of Genoa on the west, Modena on the north, and Tuscany on the east. According to Keysler, it is only about 30 miles in circumference, but is exceeding fertile and populous. It contains, besides the city of Lucca, 150 villages. The number of inhabitants is computed at 120,000. The government is lodged in a gonfalonier, whose power is much the same with that of the doges of Venice and Genoa. He is assisted by nine counsellors: but the power of all the ten continues only for two months; during which time they live in the state-palace, and at the public expence. They are chosen out of the great council, which consists of 240 nobles; but even this council is changed by a new election every two years. The revenues of the republic are about 400,000 scudi or crowns; out of which they maintain 500 men by way of regular force, and 70 Swiss as a guard to their acting magistrates. The city of Lucca is situated in a plain, terminating in most delightful eminences, adorned with villas, summer-houses, corn-fields, and plantations of every kind; so that nothing either for use or for pleasure is here wanting. The city, which is about three Italian miles in circumference, has regular well-lined fortifications; and its streets though irregular, are wide, well paved, and full of handsome houses. The number of its inhabitants is computed to be above 40,000; and they carry on large manufactures, especially of silk stuffs. Lucca has a bishop, who enjoys several extraordinary privileges; and its cathedral is Gothic. The city stands in E. Long. 11. 27. N. Lat. 43. 52.

LUCENTI, Lucentia, or *Lucentum*, a town of the Hither Spain, now Alicant, a sea-port of Valencia. W. Long. 32. Lat. 38. 37.

LUCERES, in Roman antiquity, the third in order of the three tribes into which Romulus divided the people; including all foreigners: so called from the *lucus* or grove, where Romulus opened an asylum.

LUCERIA, in *Ancient Geography*, a town of Apulia in Italy; which in Strabo's time still exhibited marks of Diomed's sovereignty in those parts. Ptolemy has *Nuceria*; whether from mistake, or the custom of his time, uncertain. Now *Nocera de Pagani*, in the kingdom of Naples. E. Long. 15. 0. N. Lat. 40. 40.

LUCERIUS, in *Mythology*, a name given to Jupiter, as *Lucceria* was given to Juno, as the deities which gave light to the world.

LUCERNE, one of the 13 cantons of Swisserland. It holds the third place among the 13; and is the head of the Catholic cantons. Though less than Zurich, and consequently much less than Berne, it is, however, far more extensive than any of the rest, being 15 or 16 leagues long, and eight broad. The population is estimated at 100,000. Even the mountainous part is not barren, but abundant in wood and pasture, furnishing cattle, hides, cheese, and butter, for exportation. All the north part is fertile in grain, fruit, and hay; supplying sufficient for the consumption of the inhabitants; but as the mountaineers of the little cantons come to their market for corn, the people of Lucerne purchase this commodity from other parts of Swisserland, but especially from Alsace and Suabia.

Lucerne. Suabia. Their manufactures are very inconsiderable; consisting only in a little silk and cotton thread.—The government is oligarchical. The councils are chosen from among 500 citizens only. The great council of 64 members is the nominal sovereign; but in fact the power resides in the senate, or little council of 36, having for their chiefs the two avoyers.—The whole canton professes the Roman Catholic religion. The pope's nuncio, with the title of legate *à latere*, usually resides at Lucerne.—They threw off the Austrian yoke in 1352, and by entering into a perpetual alliance with the three ancient cantons, they gave such weight to the confederacy, as to enable it in 1386 to resist all the efforts of the enemy at the bloody battle of Sempach.

The *town of Lucerne* is situated at the extremity of a most beautiful lake of the same name, where the river Reuss issues from it. The buildings are ancient, and the streets narrow; nor is Lucerne populous in proportion to its extent, the inhabitants being only between 3000 and 4000. Since this is the great passage to Italy by Mount St Gothard, and the merchandise which passes the Alps on mules, and is to be transported by the rivers Reuss, Aar, and Rhine, is all deposited here, it might have a flourishing trade if arts and manufactures were attended to. The Reuss separates the town into two unequal parts, which are connected by three bridges: one wide for carriages; and two narrow covered ones for foot passengers: besides these, there is a fourth over an arm of the lake, to pass to the cathedral. Three of these bridges have old bad paintings of the Dance of Death, and the History of the Bible, and of Swisserland. They make a commodious dry walk for the inhabitants.—Of religious edifices, the principal are the cathedral, or collegiate church of St Leger; the convent of Cordeliers; the college of the Jesuits; the convent of Capuchins; and two convents of nuns. Of the secular buildings, the hotel de ville is the principal. The arsenal is well furnished. The water tower is remarkable only for its position and antiquity; it is said to have been a pharos or lighthouse. What greatly attracts the notice of most strangers is, a plan in relief of part of the cantons of Lucerne, Zug, and Berne, and the whole of Schweitz, Uri, and Underwald, executed by General Pfiffer on a large scale. He has completed about 60 square leagues; the plan is 12 feet long, and nine and a half broad: every mountain is accurately measured; and every object distinctly placed.

The *lake of Lucerne* exhibits greater variety and more picturesque scenery than any other of the Swiss lakes. It is seven leagues long in a right line, and three wide about Kussnacht; but the shape is very irregular. The whole south side is bordered by high mountains; but the north exhibits hills of no great height. The narrow gulf that extends towards the west, is bordered on the west and north-west by Mount Pilat, which is a single mountain rising boldly more than 6000 feet above the lake; and on the south by Mount Burgenberg. Stanz Stadt, belonging to the canton of Underwald, is on this side; and at this place the lake is deepest. Kussnacht is on the point of the other gulf, which extends towards the east, and is wider than the former. All the country to the west of these gulfs, and part of it to the north of the latter, belongs to the canton of Lucerne; but that which is to the south and north-east is dependent on the canton of Zug. All the mountains on the left shore of the lake belong to the canton of Underwald; those on the right, partly to the canton of Uri, partly to that of Schweitz, partly to the little republic of Gersaw, but principally to the canton of Lucerne. Lucerne, Lucia.

LUCERNE, in *Botany*. See MEDICAGO, BOTANY *Index*.—For the culture of this plant, see AGRICULTURE *Index*.

LUCIA, ST, one of the Caribbee islands in the West Indies, about 22 miles long, and 11 broad, the middle of it lying in N. Lat. 39. 14. W. Long. 27. 0. It was first settled by the French in 1650; but was reduced by the English in 1664, who evacuated it in 1666. The French immediately resettled the island, but were again driven away by the Caribbs. As soon as the savages were gone, the former inhabitants returned, but only for a short time; for being afraid of falling a prey to the first privateer that should visit their coasts, they removed either to other French settlements that were stronger, or which they might expect to be better defended. There was then no regular culture or colony at St Lucia; it was only frequented by the inhabitants of Martinico, who came thither to cut wood, and to build canoes, and who had considerable docks on the island. In 1718 it was again settled by the French; but four years after, it was given by the court of London to the duke of Montague, who was sent to take possession of it. This occasioned some disturbance between the two courts; which was settled, however, by an agreement made in 1731, that, till the respective claims should be finally adjusted, the island should be evacuated by both nations, but that both should wood and water there. This precarious agreement furnished an opportunity for private interest to exert itself. The English no longer molested the French in their habitations; but employed them as their assistants in carrying on with richer colonies a smuggling trade, which the subjects of both governments thought equally advantageous to them. This trade has been more or less considerable till the treaty of 1763, when the property of St Lucia was secured to the crown of France. After that time the colony flourished considerably. In the beginning of the year 1772, the number of white people amounted to 2018 souls, men, women, and children; that of the blacks to 663 free men, and 12,795 slaves. The cattle consisted of 928 mules or horses, 2070 head of horned cattle, and 3184 sheep or goats. There were 38 sugar plantations, which occupied 978 pieces of land; 5,595,889 coffee-trees; 1,321,600 cocoa plants; and 367 plots of cotton. There were 706 dwelling places. The annual revenue at that time was about 175,000l. which, according to the Abbé Raynal, must have increased one-eighth yearly for some time. It was taken by the British in 1778; restored to France in 1783. It fell again into the hands of the British in 1794, was evacuated in 1795, and was again retaken in 1796.

The soil of St Lucia is tolerably good, even at the sea side; and is much better the farther one advances into the country. The whole of it is capable of cultivation, except some high and craggy mountains which

bear

Lucia || Lucianists.

bear evident marks of old volcanoes. In one deep valley there are still eight or ten ponds, the water of which boils up in a dreadful manner, and retains some of its heat at the distance of 6000 toises from its reservoirs. The air in the inland parts, like that of all other uninhabited countries, is foul and unwholesome; but grows less noxious as the woods are cleared and the ground laid open. On some parts of the sea coast, the air is still more unhealthy, on account of some small rivers which spring from the foot of the mountains, and have not sufficient slope to wash down the sands with which the influx of the ocean stops up their mouths, by which means they spread themselves into unwholesome marshes on the neighbouring grounds. St Lucia was restored to France in 1815.

LUCIA, *St*, a high and mountainous island of Africa, and one of those of Cape Verde, is about nine leagues long, and lies in the latitude of 16° 18′ N. according to the English geographers; but according to all others, it is a degree farther to the northward. On the east-south-east side is a harbour, with a bottom and shore of white sand; but its best road is opposite to St Vincent's to the south-west, where there are at least 20 fathoms of water. On the west side there is no water: it abounds with goats, sea and land fowl, tortoises, &c. but whether it hath any inhabitants is not certainly known.

LUCIAN, a celebrated Greek author in the first century, was born at Samosata, of obscure parents, in the reign of the emperor Trajan. He studied law, and practised some time as an advocate; but growing weary of the wrangling oratory of the bar, he commenced rhetorician. He lived to the time of Marcus Aurelius, who made him register of Alexandria in Egypt; and, according to Suidas, he was at last worried by dogs. Lucian was one of the finest wits in all antiquity. His Dialogues, and other works, are written in Greek. In these he has joined the useful to the agreeable, instruction to satire, and erudition to elegance; and we everywhere meet with that fine and delicate raillery which characterizes the Attic taste.—Those who censure him as an impious scoffer at religion, have reason on their side, if religion consisted in the theology of the Pagan poets, or in the extravagant opinions of philosophers; for he perpetually throws such ridicule on the gods and philosophers, with their vices, as inspires hatred and contempt for them; but it cannot be said that he writes anywhere against an overruling providence.

LUCIANISTS, or LUCANISTS, a religious sect, so called from Lucianus, or Lucanus, a heretic of the second century, being a disciple of Marcion, whose errors he followed, adding some new ones to them. Epiphanius says he abandoned Marcion; teaching that people ought not to marry, for fear of enriching the Creator: and yet other authors mention that he held this error in common with Marcion and other Gnostics. He denied the immortality of the soul; asserting it to be material.

There was another sect of Lucianists, who appeared some time after the Arians. They taught, that the Father had been a father always, and that he had the name even before he begot the Son; as having in him the power or faculty of generation; and in this manner they accounted for the eternity of the Son.

LUCID INTERVALS, the fits of lunatics or maniacs, during which the phrenzy leaves them in possession of their reason.

Lucid Interval || Lucretius.

LUCIFER, according to the poets, was the son of Jupiter and Aurora. In astronomy, Lucifer is the bright planet Venus, which either goes before the sun in the morning, for 290 days, and is our morning star; or in the evening follows the sun, during the same time, and then is called *Hesperus* or the evening star.

LUCIFERA, in *Mythology*, a surname given to Diana, under which title she was invoked by the Greeks in childbed. She was represented as covered with a large veil, interspersed with stars, bearing a crescent on her head, and holding in her hand a lighted flambeau.

LUCIFERIANS, a religious sect, who adhered to the schism of Lucifer, bishop of Cagliari, in the fourth century, who was banished by the emperor Constantius, for having defended the Nicene doctrine concerning the three Persons in the Godhead.—St Augustine seems to intimate, that they believed the soul, which they considered as of a carnal nature, to be transmitted to the children from their fathers. Theodoret says, that Lucifer was the author of a new error. The Luciferians increased mightily in Gaul, Spain, Egypt, &c. The occasion of the schism was, that Lucifer would not allow any acts he had done to be abolished. There were but two Luciferian bishops, but a great number of priests and deacons. The Luciferians bore a peculiar aversion to the Arians.

LUCILIUS, CAIUS, a Roman knight, and a Latin poet, was born at Suessa in Italy, about 140 B. C. he served under Scipio Africanus in the war with the Numantines; and was in great favour with that celebrated general, and with Lælius. He wrote 30 books of satires, in which he lashed several persons of quality very sharply. Some learned men ascribe the invention of satire to him; but M. Dacier has maintained, with great probability, that Lucilius only gave a better turn to that kind of poetry, and wrote it with more wit and humour than his predecessors Ennius and Pacuvius had done. His fragments have been carefully collected by Francis Douza at Leyden in 1599, with notes. But they require still to be better illustrated by some learned critic.

LUCINA, a goddess among the Romans, who presided over women in labour. Some take her to be Diana, others Juno. She was called *Lucina*, because she brought children to the light; from the Latin word *lux*, "light."

LUCIUS, the specific name of the pike. See ESOX, ICHTHYOLOGY *Index*.

LUCONIA. See MANILLA.

LUCRETIA, the famous Roman matron, wife of Collatinus, and the cause of the revolution in Rome from a monarchy to a republic: this lady being ravished by Sextus, the eldest son of Tarquin king of Rome, stabbed herself, 509 B. C. See the article CHASTITY. The bloody poniard, with her dead body exposed to the senate, was the signal of Roman liberty; the expulsion of the Tarquins, and abolition of the regal dignity, was instantly resolved on, and carried into execution. See ROME.

LUCRETIUS, or TITUS LUCRETIUS, CAIUS, one

Lucretius || Lucus.

of the most celebrated of the Latin poets, was born of an ancient and noble Roman family, and studied at Athens, where he became one of Epicurus's sect. He acquired great reputation by his learning and eloquence; but in the flower of his age fell into a frenzy, occasioned by a philtre given him by his wife, who was distractedly fond of him. Lucretius, during the intervals of his madness, put Epicurus's doctrines into verse, and composed his six books *De Rerum Natura*, which are still extant. It is said that he killed himself in a fit of madness, in the 54th year before the Christian era, when 51 years old. The most correct edition of Lucretius is that of Simon de Coline. The cardinal de Polignac has refuted Lucretius's arguments, in his excellent Latin poem entitled *Anti-Lucretius*. His poem *De Rerum Natura* has been translated into English by Mr Creech.

LUCRINUS LACUS, in *Ancient Geography*, a lake of Campania, between Baiæ and Puteoli, famous for its oysters (Horace, Martial, Juvenal); *Lucrinenses* (Cicero), the people dwelling on it. Now a perfect bay since the earthquake in 1538.

LUCULLUS, LUCIUS LICINIUS, a Roman general celebrated for his eloquence, his victories, and his riches. In his youth he made a figure at the bar; and being afterwards made quæstor in Asia, and prætor in Africa, governed those provinces with great moderation and justice. Scarce was he known as a military man, when he twice beat the fleet of Hamilcar, and gained two great victories over him. His happy genius was greatly improved by study; for he employed his leisure in reading the best authors on military affairs. Being made consul with Aurelius Cotta, during the third war with Mithridates king of Pontus, he was sent against this prince: and this expedition was attended with a series of victories, which did him less honour than an act of generosity towards his colleague; who, willing to take advantage of his absence to signalize himself by some great exploit, hastened to fight Mithridates; but was defeated and shut up in Chalcedonia; where he must have perished, if Lucullus, sacrificing his resentment to the pleasure of saving a Roman citizen, had not flown to his assistance, and disengaged him. All Pontus then submitted to Lucullus; who being continued in his government of Asia, entered the territories of Tigranes, the most powerful king in Asia. That prince marched with a formidable army against Lucullus: who defeated him with a handful of men, and killed great numbers of his forces; took Tigranocertes, the capital of his kingdom; and was ready to put an end to the war, when the intrigues of a tribune got him deposed, and Pompey nominated in his room. Lucullus having brought home prodigious riches, now gave himself up to excessive luxury; and his table was served with a profusion till that time unknown. He brought from the East a great number of books, which he formed into a library, and gave admittance to all men of learning, who frequented it in great numbers. Toward the end of his life, he fell into a kind of madness: and Lucullus, his brother, was appointed his guardian. He is said to have been the first who brought cherries into Europe, having brought the grafts from the kingdom of Pontus.

LUCUS, in general, denotes a wood or grove sacred to a deity; so called *à lucendo*, because a great number of lights were usually burning in honour of the god (Isidorus); a practice common with idolaters, as we learn from Scripture: hence Homer's αγλαον αλσος.

Lucus || Ludi.

LUD, a British king mentioned in our old chronicles, and said to have reigned about the year of the world 3878. He is reported to have enlarged and walled about *Troynovant*, or New Troy, where he kept his court, and made it his capital. The name of *London* is hence derived from *Lud's town;* and *Ludgate* from his being buried near it: but this is only one among many other derivations of the name of London; which are at least equally probable. See LONDON.

LUDAMAR, a Moorish kingdom in the interior part of Africa, the capital of which is situated in N. Lat. 15. 0. W. Long. 6. 50. which Mr Park considers as little superior to a desert. The Moors of Ludamar subsist chiefly on the flesh of their cattle.

The barrenness of the country is such, that it furnishes few materials for manufacture: but the inhabitants contrive to weave a strong cloth, with which their tents are covered; the thread is spun by the women from goats hair, and with the hides of their cattle they furnish saddles, bridles, pouches, and other articles of leather. They can also convert the native iron procured from the negroes into spears, knives, and pots for boiling their food; but they purchase their fire-arms and other weapons of a similar nature from the Europeans, in exchange for slaves.

Their ideas of female perfection are truly singular, since a woman, to have the smallest pretensions to beauty, must be one who requires a slave under each arm to support her as she walks; and a perfect beauty, according to Mr Park, is a load for a camel.

The wealth of the Moors chiefly consists in their numerous herds of cattle, yet the majority of the people spend their days in a state of idleness. The tent of the king is the common place of rendezvous for the indolent, where they appear to enjoy an unlimited liberty of speech; yet in the praise of their sovereign they are wholly unanimous, singing songs to his honour, which never fail to be filled with the grossest adulation. The king sometimes eats out of the same bason with the driver of his camels, and during the heat of the day reposes himself upon the same bed.

Cavalry constitute the chief military strength of Ludamar, which are well mounted, and are very expert in attacking by surprise. The horse of every soldier is furnished by himself, as also his military implements, consisting of a large sabre, a double-barrelled gun, a red leather bag for holding his balls, and a powder-horn slung over his shoulder. He has no pay, and his only compensation arises from plunder.

They have no intercourse with civilized nations, yet they boast an advantage over the negroes, as they possess, though in a very limited degree, the knowledge of letters. They are esteemed the vainest, proudest, and most bigotted, ferocious, and intolerant of all the nations of the earth, blending in their character the blind superstition of the negro with the savage cruelty and treachery of the Arab. It was with the utmost difficulty that Mr Park made his escape from this cruel and inhospitable people.

LUDI, a term used for shows and public representations

Ludi || Ludlow.

tations made by the Romans for the entertainment of the people.' See GAMES.

For an account of the particular games of Greece and Rome, as the Isthmian, Nemæan, Olympic, &c. See ISTHMIAN, &c.

LUDIUS, a celebrated painter, lived in the reign of Augustus Cæsar, and excelled in grand compositions. He was the first who painted the fronts of houses in the streets of Rome; which he beautified with great variety of landscapes, and many other different subjects.

LUDLOW, EDMUND, son of Sir Henry Ludlow, was born at Maidenhead, and educated in Trinity college, Oxford. His father opposing the king's interest, Mr Ludlow joined with the same party, and was present at the battle of Edgehill as a volunteer under the earl of Essex. Upon the death of his father, he was chosen knight of the shire for Wilts, and obtained the command of a regiment of horse for the defence of that country. He was one of King Charles I.'s judges: after whose death he was sent by the parliament into Ireland, in quality of lieutenant-general of the horse; which employment he discharged with diligence and success till the death of the lord-deputy Ireton, when he acted for some time as general, though without that title; Cromwell, who knew him to be sincerely in the interest of the commonwealth, always finding out some pretext to hinder the conferring of that character upon him. The last stroke had been given by Ludlow to the Irish rebellion, if the usurpation of Cromwell had not prevented it. Under his power he never acted; and though Cromwell used his utmost efforts, he remained inflexible. After Cromwell's death, he endeavoured to restore the commonwealth: but Charles II. being recalled, he thought proper to conceal himself, and escaped into Switzerland, where he settled. After the Revolution, he came over into England, in order to be employed in Ireland against King James: but appearing publicly in London, it gave great offence; and an address was presented by Sir Edward Seymour to King William III. for a proclamation in order to apprehend Colonel Ludlow, attainted for the murder of King Charles I. Upon this he returned to Switzerland, where he died. During his retirement in Switzerland he wrote his Memoirs.

LUDLOW, a town of Shropshire in England, situated at the conflux of the Teme and Corve, 18 miles from Shrewsbury, and 138 from London. The president of the council of the marches, established by Henry VIII. generally kept his courts in it, by which the town was much benefited, these courts not having been abolished till the 1st of William and Mary. Its neighbourhood to Wales makes it a great thoroughfare, and engages many of the Welsh to send their children of both sexes to it for education. It was incorporated by Edward IV. and among other privileges has that of trying and executing criminals within itself. It is one of the neatest towns in England, with walls and seven gates. It is divided into four wards; and is governed by 2 bailiffs, 12 aldermen, 25 common-council men, a recorder, a town-clerk, steward, chamberlain, coroner, &c. From the castle on the top of the hill on which the town stands is a most delightful prospect. In an apartment of the outer gatehouse Samuel Butler is said to have written the first part of Hudibras. Of this castle, which was besieged and taken by King Stephen, some of the offices are fallen down, and great part of it turned into a bowling-green; but part of the royal apartments and the sword of state are still left. The walls were at first a mile in compass, and there was a lawn before it for near two miles, of which much is now enclosed. The battlements are very high and thick, and adorned with towers. It has a neat chapel, where are the coats of arms of abundance of Welsh gentry, and over the stable-doors are the arms of Queen Elizabeth, the earls of Pembroke, &c. This castle was a palace of the prince of Wales, in right of his principality. The river Teme has a good bridge over it, several wears across it, and turns a great many mills. Here is a large parochial church, which was formerly collegiate; in the choir whereof is an inscription relating to Prince Arthur, elder brother to King Henry VIII. who died here, and whose bowels were here deposited, though it is said his heart was taken up some time ago in a leaden box. In this choir is a closet, commonly called *God's House*, where the priests used to keep their consecrated utensils; and in the market-place is a conduit, with a long stone cross on it, and a niche wherein is the image of St Laurence, to whom the church was dedicated. On the north side of the town there was a rich priory, whereof there are few ruins to be seen except those of its church. Here are an alms-house for 30 poor people, and two charity-schools where 50 boys and 30 girls are both taught and clothed. It has a market on Monday, and three lesser ones on Wednesday, Friday, and Saturday. Its fairs are on the Tuesday Easter, Whit-Wednesday, August 21. Sept. 28. and Dec. 8. Provisions are very cheap here; and at the annual horse races there is the best of company. The country round is exceedingly pleasant, fruitful, and populous, especially that part called the *Corvesdale*. Ludlow sends two members to parliament, and contained 4150 inhabitants in 1811.

Ludlow, Ludolph.

LUDOLPH, JOB, a very learned writer of the 17th century, was born at Erfurt in Thuringia. He travelled much, and was master of 26 languages, visited libraries, searched after natural curiosities and antiquities everywhere, and conversed with learned men of all nations. He published a History of Ethiopia, and other curious books.

LUDOLPH, *Henry William*, nephew of Job above mentioned, was born at Erfurt in 1655. He came over to England as secretary to M. Lenthe, envoy from the court of Copenhagen to that of London; and being recommended to Prince George of Denmark, was received as his secretary. He enjoyed this office for some years, until he was incapacitated by a violent disorder; when he was discharged with a handsome pension: after he recovered, he travelled into Muscovy, where he was well received by the czar, and where his knowledge made the Muscovite priests suppose him to be a conjurer. On his return to London in 1694, he was cut for the stone; and as soon as his health would permit, in acknowledgement of the civilities he had received in Muscovy, he wrote a grammar of their language, that the natives might learn their own tongue in a regular method. He then travelled into the East, to inform himself of the state of the Christian church

Ludolph || Lugeus Lacus.

in the Levant; the deplorable condition of which induced him, after his return, with the aid of the bishop of Worcester, to print an edition of the New Testament in the vulgar Greek, to present to the Greek church. In 1709, when such numbers of Palatines came over to England, Mr Ludolph was appointed by Queen Anne one of the commissioners to manage the charities raised for them; and he died early the following year. His collected works were published in 1712.

LUDWIGIA, a genus of plants, belonging to the tetrandria class, and in the natural method ranking under the 17th order, *Calycanthemæ*. See BOTANY *Index*.

LUES, among physicians, is in general used for a disease of any kind; but in a more particular sense is restrained to contagious and pestilential diseases; thus the *lues Gallica*, or *venerea*, signifies the venereal disease. See MEDICINE *Index*.

LUFF, the order from the pilot to the steersman to put the helm towards the *lee*-side of the ship, in order to make the ship sail nearer the direction of the wind. Hence, luff round, or luff a-lee, is the excess of this movement, by which it is intended to throw the ship's head up in the wind, in order to tack her, &c. A ship is accordingly said to spring her luff when she yields to the effort of the helm, by sailing nearer to the line of the wind than she had done before. See also *HAULING the Wind*.

LUFF-Tackle, a name given by sailors to any large tackle that is not destined for a particular place, but may be variously employed as occasion requires. It is generally somewhat larger than the jigger tackle, although smaller than those which serve to hoist the heavier materials into and out of the vessel, which latter are the main and fore tackles, the stay and quarter tackles, &c.

LUG-SAIL, a square sail, hoisted occasionally on the mast of a boat or small vessel upon a yard which hangs nearly at right angles with the mast. These are more particularly used in the barca longas, navigated by the Spaniards in the Mediterranean.

LUGDUNUM, in *Ancient Geography*, the capital of the Segusiani in Gallia Celtica, situated at the conflux of the Arar and Rhodanus, on an eminence, as the Celtic term *dune* signifies; built by Manutius Plancus under Augustus, while commanding in that part of Gaul; and whither he led a colony. Now *Lyons*, capital of the Lyonnois.

LUGDUNUM Batavorum, in *Ancient Geography*, a town of the Batavi in Gallia Belgica. Now *Leyden* in Holland.

LUGDUNUM Convenarum, in *Ancient Geography*, a town of Gaul in Aquitain, at the foot of the Pyrenees. Now *S. Bertrand*, in Gascony.

LUGEUS LACUS, in *Ancient Geography*, a lake of Japydia, the westmost district of Illyricum, to the south of the Save, and near the head of the Arsia. Now commonly called the *Zirichnitz Lake*, from a small adjoining town. It is locked on every side with mountains; from which scanty currents run down; the less in quantity their waters, because drank up by the earth; till at length they are swallowed up in rocky furrows, so formed as to resemble artificial. In these the water being so redundant as to refuse receiving any more, they regurgitate, and return the water with extraordinary celerity, which thus spreading itself, forms a lake, in most places 18 cubits deep. These waters afterwards retire with no less celerity than they came on, not only through the furrows, but pass through the whole of the bottom, as through a sieve; which when perceived by the inhabitants, they directly stop up the larger apertures, and thus take large quantities of fish: when the lake is dry, they cut down their harvest on the spot where they sowed, and sow again before the inundation comes on: and grass shoots so quick on it, that it may be cut down in three weeks time, (Lazius, Wernherus.)

Lugeus Lacus || Lulli.

LUGGERSHALL, a borough of Wiltshire, 12 miles north of Salisbury, and 75 north by west of London. It is an ancient borough by prescription, though but a small hamlet, near the forest of Chute, in a delightful country; and was the residence of several kings. It had formerly a castle. It is governed by a bailiff chosen yearly at the lord of the manor's court-leet. On the neighbouring downs there used to be horse-races. Population in 1811, 487.

LUKE, ST, the evangelist, and the disciple of the apostles, was originally of Antioch in Syria, and by profession a physician. He particularly attached himself to St Paul, and was his faithful companion in his travels and labours. He went with him to Troas in Macedonia about the year 51. He wrote his gospel in Achaia about the year 53; and, ten years after, the acts of the Apostles, which contains a history of 30 years. Of all the inspired writers of the New Testament, his works are written in the most elegant Greek. It is believed that St Luke died at Rome, or in Achaia.

Gospel of St LUKE, a canonical book of the New Testament. Some think that it was properly St Paul's Gospel; and that, when the apostle speaks of *his* Gospel, he means what is called *St Luke's*. Irenæus says, that St Luke digested into writing what St Paul preached to the Gentiles; and Gregory Nazianzen tells us, that St Luke wrote with the assistance of St Paul.

St LUKE the Evangelist's Day, a festival in the Christian church, observed on the 18th of October.

LULA, a town of Swedish Lapland; seated at the mouth of the river Lula, on the west side of the gulf of Bothnia, 42 miles south-west of Tornea. E. Long. 21. 0. N. Lat. 64. 30.

LULA Lapmark, a province of Swedish Lapland; bounded by that of Tornea on the north, by the Bothnic gulf on the east, by Pithia Lapmark on the south, and Norway on the west.

LULLI, JOHN BAPTIST, the most celebrated and most excellent musician that has appeared in France since the revival of learning, was born at Florence. He was taken to France when very young by a person of quality; and he carried the art of playing on the violin to the highest perfection. Louis XIV. made him superintendant of music. Some time after Perinna having introduced operas into France, and quarrelling with his company, he resigned his privilege to Lulli. Operas were then carried to the utmost perfection by this celebrated musician, and were attended with continual

Lulli-
||
Luna.

nual applause. Lulli every year, after this time, gave a piece of his own composition, till his death, which happened in 1687.

LULLY, RAYMOND, a writer on alchemy, surnamed the *Enlightened Doctor*, was born in the island of Majorca in 1225. He applied himself with indefatigable labour to the study of the Arabian philosophy, to chemistry, physic, and divinity; and acquired great reputation by his works. He at length went to preach the gospel in Africa; and was stoned to death in Mauritania, at the age of 80. He is honoured as a martyr at Majorca, whither his body was carried. He wrote many treatises on all the sciences, in which he shows much study and subtility, but little judgment or solidity. A complete edition of his works has been printed at Mentz.—He ought not to be confounded with Raymond Lully of Terraca, surnamed *Neophyta*, who from being a Jew turned Dominican friar. This last Lully maintained several opinions that were condemned by Pope Gregory XI.

LUMBAGO, a fixed pain in the small of the back. See MEDICINE *Index*.

LUMBARIS, a name given to the arteries and veins which spread over the loins.

LUMBRICAL, a name given to four muscles of the fingers and to as many of the toes.

LUMBRICUS, the WORM, a genus of animals belonging to the order of vermes intestina. See HELMINTHOLOGY *Index*.

LUMELLO, a village in Italy, which gives name to the Lumellin, a small district in the duchy of Milan, lying along the river Po, and of which Mortaria and Valencia are the principal places. It was ceded to the duke of Savoy in 1707, and confirmed by the treaty of Utrecht in 1713. E. Long. 8. 42. N. Lat. 45. 5.

LUMINOUS, an epithet applied to any thing that shines or emits light.

Luminous Emanations have been observed from human bodies, as also from those of brutes. The light arising from currying a horse, or from rubbing a cat's back, are known to most. Instances of a like kind have been known on combing a woman's head. Bartholin gives us an account, which he entitles *mulier splendens*, of a lady in Italy whose body would shine whenever slightly touched with a piece of linen. These effluvia of animal bodies have many properties in common with those produced from glass; such as their being lucid, their snapping, and their not being excited without some degree of friction; and are undoubtedly electrical, as a cat's back has been found strongly electrical when stroaked. See ELECTRICITY and LIGHT.

LUMINOUSNESS OF THE SEA. See LIGHT and SEA.

Luminousness of Putrescent Substances. See LIGHT.

LUMP-FISH. See CYCLOPTERUS, ICHTHYOLOGY *Index*.

LUNA, in *Ancient Geography*, a forest of Germany, at no great distance from the Hercynian; below which were the Boemi: it was therefore in Moravia, near the springs of the Marus, now March, which runs into the Danube over against Carnutum.

LUNA, or *Lunna*, a town of Gallia Celtica. Now *Clugny* in Burgundy.

LUNA, a town and port of Liguria, at the mouth of the Macra. The town was but small, but the port large and beautiful, according to Strabo. Now extinct, and its ruins called *Luna Distructa*. It was famous for its quarries of white marble, thence called *Lunense*; and for its cheese, remarkable rather for its size than goodness, each being a thousand weight.

Luna
||
Lunatic.

LUNA, in *Astronomy*, the moon. See ASTRONOMY, *passim*.

LUNA, in the jargon of the alchemists, signifies *silver*; so called from the supposed influence of the moon thereupon.

Luna Cornea, in *Chemistry*, is a compound of muriatic acid with silver. See SILVER, MURIATE OF, CHEMISTRY *Index*.

LUNACY, a species of madness. See LUNATIC, and MEDICINE *Index*.

LUNACY, in *Law*. See IDIOCY and LUNATIC.

LUNÆ MONS, in *Ancient Geography*, a promontory of Lusitania. Now *Rock of Lisbon*. W. Long. 10. N. Lat. 38. 50.—Another *Lunæ Mons* of Ethiopia, from which the Nile was supposed to take its rise.

Lunæ Portus, a very extensive port, or more truly a bay, of Liguria, between Portus Veneris and Portus Ericis, 20 miles in compass. Now *il Golfo della Spezzia*, on the east coast of the territory of Genoa.

LUNAR, something relating to the MOON.

Lunar Month. See MONTH.

Lunar Year, consists of 354 days, or 12 synodical months. See YEAR.

Lunar Dial. See DIALLING.

LUNARE os, in *Anatomy*, is the second bone in the first row of the carpus. It has its name from the Latin, *luna*, "the moon," because one of its sides is in form of a crescent.

LUNARIA, SATIN-FLOWER, or *Moonwort*; a genus of plants belonging to the tetradynamia class; and in the natural method ranking under the 39th order, *Siliquosæ*. See BOTANY *Index*.

LUNARIUM, in *Ancient Geography*, a promontory of the Hither Spain, between Blanda and Baetulo. Commonly called *el Cabo de Palafugel*, in Catalonia, on the Mediterranean; or *Cabo de Tosa*, on the same coast, and in Catalonia, 15 miles from the former, to the west.

LUNATIC, a person affected with that species of madness termed *lunacy*. The word is indeed properly applied to one that hath lucid intervals; sometimes enjoying his senses, and sometimes not; and that frequently supposed to depend on the influence of the moon.

LUNATIC, in *Law*. Under the general term of *non compos mentis* (which Sir Edward Coke says is the most legal name), are comprised not only lunatics, but persons under frenzies, or who lose their intellects by disease; those that *grow* deaf, dumb, and blind, not being *born* so; or such, in short, as are judged by the court of chancery incapable of conducting their own affairs. To these also, as well as idiots, the king is guardian, but to a very different purpose. For the law always imagines, that these accidental misfortunes may be removed; and therefore only constitutes the crown a trustee for the unfortunate persons, to protect their property, and to account to them for all profits received, if they recover, or after their decease to their representative

Lunatic || Lundy.

representatives. And therefore it is declared by the statute 17 Edw. II. c. 10. that the king shall provide for the custody and sustentation of lunatics, and preserve their lands, and the profits of them, for their use when they come to their right mind; and the king shall take nothing to his own use: and if the parties die in such estate, the residue shall be distributed for their souls by the advice of the ordinary, and of course (by the subsequent amendments of the laws of administrations) shall now go to their executors or administrators.

On the first attack of lunacy, or other occasional insanity, when there may be hopes of a speedy restitution of reason, it is usual to confine the unhappy objects in private custody under the direction of their nearest friends and relations; and the legislature, to prevent all abuses incident to such private custody, hath thought proper to interpose its authority, by 14 Geo. III. c. 49. for regulating private mad-houses. But when the disorder is grown permanent, and the circumstances of the party will bear such additional expence, it is thought proper to apply to the royal authority to warrant a lasting confinement.

The method of proving a person *non compos* is very similar to that of proving him an idiot. The lord chancellor, to whom, by special authority from the king, the custody of idiots and lunatics is intrusted, upon petition or information, grants a commission in nature of the writ *de idiota inquirendo*, to inquire into the party's state of mind; and if he be found *non compos*, he usually commits the care of his person, with a suitable allowance for his maintenance, to some friend, who is then called his committee. However, to prevent sinister practices, the next heir is seldom permitted to be of this committee of the person; because it is his interest that the party should die. But it hath been said there lies not the same objection against his next of kin, provided he be not his heir; for it is his interest to preserve the lunatic's life, in order to increase the personal estate by savings, which he or his family may hereafter be entitled to enjoy. The heir is generally made the manager or committee of the estate, it being clearly his interest by good management to keep it in condition: accountable, however, to the court of chancery, and to the *non compos* himself, if he recovers; or otherwise, to his administrators. See IDIOCY.

LUNATION, the period or space of time between one new moon and another; also called *synodical month*. See CYCLE and EPACT.

LUNDEN, or LUND, a considerable town of Sweden, in Gothland; and capital of the territory of Schonen, with an archbishop's see and an university. It was ceded to the Swedes by the Danes in 1658. E. Long. 13. 25. N. Lat. 55. 40.

LUNDY ISLAND, situated 50 miles in the sea, off the north-west coast of Devonshire, is five miles long and two broad, but so encompassed with inaccessible rocks, that it has but one entrance to it, so narrow that two men can scarcely go abreast. It is reckoned in the hundred of Brandon. It had once both a fort and a chapel. The south part of it is indifferent good soil, but the north part of it is barren, and has a high pyramidal rock called the *Constable*. Here are horses, kine, hogs, and goats, with great store of sheep and rabbits; but the chief commodity is fowl, with which it abounds much, their eggs being very thick on the ground at their season of breeding. No venomous creature will live in this island. In the reign of Henry VIII. one William Morisco, who had conspired to murder him at Woodstock, fled to this island, which he fortified, turned pirate, and did much damage to this coast; but was taken by surprise at length, with 16 of his accomplices, and put to death.

Lundy || Lunenburg.

LUNE, LUNULA, in *Geometry*, a plane in form of a crescent or half-moon, terminated by the circumference of two circles, that intersect each other within.

LUNENBURG, or LUNENBURG *Zell*, a principality of Germany, forming part of the kingdom of Hanover, bounded to the south by that of Calenberg, the diocese of Hildesheim, and the duchy of Brunswic; to the north, by the duchy of Lauenburg and the Elbe, by the last of which it is separated from the territory of the imperial city of Hamburgh; to the east, by the duchy of Brunswic, the Alte Mark, and the duchy of Mecklenburg; and to the west, by the duchies of Bremen and Verden, the county of Hoya, and the principality of Calenberg. The soil, except along the Elbe, Aller, and Jetz, is either sand, heath, or moor. In the more fruitful parts of it are produced wheat, rye, barley, oats, pease, buck-wheat, flax, hemp, hops, pulse, oak, beech, firs, pines, birch, and alder, together with black cattle and horses. The heaths abound with bees and honey, and a small kind of sheep whose wool is long and coarse. Lunenburg is well furnished with salt springs and limestone, and the forest of Corde with venison. The rivers Elbe, Ilmenau and Aller, are navigable; and consequently very advantageous to the country, independent of the fish which they yield. The general diets of this principality are convened by the sovereign twice a-year, and held at Zell. They consist of the deputies of the nobility and the towns of Lunenburg, Uelzen, and Zell, who have the nomination of the members of the high colleges, and other officers, jointly with the sovereign. There are near 200 Lutheran churches in the country, under two general and 15 subordinate superintendants, several grammar-schools, two Calvinist churches at Zell, and an academy of exercises at Lunenburg. The manufactures are chiefly linen cloth, cottons, ribbons, stockings, hats, starch, bleached wax, refined sugar, gold and silver wires, all kinds of wooden wares, barges, boats, and ships. The exports of these to Hamburgh, Lubec, and Altona, are considerable. The neighbourhood of these cities, with the facility of conveying goods and merchandise to them and other places, either by land or water, is very advantageous to this country, and contributes greatly to its subsistence. On account of this principality, the king of Great Britain has a seat and voice both in the college of the princes of the empire and of the circle of Lower Saxony. Its quota in the matricula is 20 horse and 120 foot, or 720 florins in lieu of them. The revenues of the principality arise chiefly from the demesnes, tolls on the Elbe, contributions, duties on cattle, beer, wine, brandy, and other commodities, which altogether must be very considerable, some bailiwics alone yielding upwards of 20,000 rix-dollars.

LUNENBURG, the capital of the principality of the same name, is a pretty large town of Germany, on the river Elmen, or the Ilmenau, which is navigable from the town to the Elbe, at the distance of 13 miles. It is 27 miles from Hamburgh, 43 from Zell, 65 from Brunswic.

Lunenburg, Lunense Marmor.

Brunswic, 76 from Bremen, 68 from Hanover; and stands in E. Long. 10. 40. N. Lat. 53. 28. Its inhabitants are reckoned at between 8000 and 9000. Formerly this was one of the Hanse towns, and an imperial city. Some derive its name from *Lina*, the ancient name of the Ilmenau; others from *Luna*, the moon, an image of which is said to have been worshipped by the inhabitants in the times of Paganism. Here were anciently several convents, viz. one of Minims, another of Premonstratensians, another of Benedictines, and a fourth of Minorites. Out of the revenues of the Benedictine monastery was founded an academy for the martial exercises, where young gentlemen of the principality of Lunenburg are maintained gratis, and taught French, fencing, riding, and dancing; but foreigners are educated at a certain fixed price. A Latin school was also founded, consisting of four classes, and well endowed out of these revenues. The superintendency and management of these, and the estates appropriated to their maintenance, belongs to the landschaft director, and the ansreiter, who are both chosen from among the Lunenburg nobility. The first came in place of the Popish abbot, and as such is head of the states of the principality, and president of the provincial college. He has the title of *excellency*; and in public instruments styles himself, *by the grace of God landschaft director* and *lord of the mansion of St Michael in Lunenburg*. The chief public edifices are three parish-churches, the ducal palace, three hospitals, the town-house, the salt-magazine, the anatomical theatre, the academy; the conventual church of St Michael, in which lie interred the ancient dukes, and in which is the famous table eight feet long, and four wide, plated over with chased gold, with a rim embellished with precious stones, of an immense value, which was taken from the Saracens by the emperor Otho, and presented to this church: but in 1698, a gang of thieves stripped it of 200 rubies and emeralds, together with a large diamond, and most of the gold, so that at present but a small part of it remains. Here are some very rich salt springs. Formerly, when there was a great demand for the salt, upwards of 120,000 tons have been annually boiled here, and sold off; but since the commencement of the present century, the salt trade hath declined greatly. A fifth of the salt made here belongs to the king, but is farmed out. It is said to excel all the other salt made in Germany. This town is well fortified; and has a garrison, which is lodged in barracks. In the neighbourhood is a good limestone quarry; and along the Ilmenau are warehouses, in which are lodged goods brought from all parts of Germany, to be forwarded by the Ilmenau to Hamburgh, or by the Asche to Lubec, from whence other goods are brought back the same way. The town itself carries on a considerable traffic in wax, honey, wool, flax, linen, salt, lime, and beer.

LUNENSE MARMOR, in the natural history of the ancients, the name of that species of white marble now known among us by the name of the *Carrara marble*, and distinguished from the statuary kind by its greater hardness and less splendour. It was ever greatly esteemed in building and ornamental works, and is so still. It is of a very close and fine texture, of a very pure white, and much more transparent than any other of the white marbles. It has always been found in great quantities in Italy, and is so to this day. See LUNA. Lunense Marmor || Lungs.

LUNETTE, in *Fortification*, an enveloped counter-guard, or elevation of earth, made beyond the second ditch, opposite to the places of arms; differing from the ravelins only in their situation. *Lunettes* are usually made in ditches full of water, and serve to the same purpose as faussebrayes, to dispute the passage of the ditch. See FORTIFICATION.

LUNETTE, in the manege, is a half horse-shoe, or such a shoe as wants the sponge, i. e. that part of the branch which runs towards the quarters of the foot.

LUNETTE is also the name of two small pieces of felt, made round and hollow, to clap upon the eyes of a vicious horse that is apt to bite, and strike with his fore feet, or that will not suffer his rider to mount him.

LUNGS, in *Anatomy*, a part of the human body, serving for respiration. See ANATOMY, N° 117.

In the *Journal de Médicine* for June 1789, is a description of an

Instrument for Inflating the Lungs, invented by M. Gorcy, physician to the military hospital at Neufbrisack, which appears to be extremely well adapted to the purpose, whilst it may be used with the greatest ease and facility.

This instrument, which the inventor styles *apodopic*, that is, "restorer of respiration," consists of a double pair of bellows, BCLM, fig. 1. the two different parts of which have no communication with each other. In the lower side BM, is an aperture A for a valve constructed on the principles of those of Mr Nairne's air-pump. It consists of a rim of copper, closed at one end by a plate of the same metal, in which plate are seven small holes placed at equal distances. This plate is covered with pieces of silk coated with elastic gum, in which are six transverse incisions of two or three lines in length. Each incision is so made as to be situated between two of the holes, and at an equal distance from each: *see* D, fig. 2. The silk must be made very secure by a thread passing several times round the rim. It is obvious, that a stream of air applied to that side of the plate which is opposite the silk, will pass through the holes, and lifting up the silk, escape through the incisions. On the contrary, a stream of air applied to the other side will press the silk upon the plate, and thus close the holes, so that it will be impossible for it to pass through them. This valve opens internally, so as to admit the air from without. At B is another valve, on the same construction, but opening in a contrary direction, thus permitting the air to escape out of the lower part into the tube EF, but preventing its entrance. At C is another valve, opening internally to admit the air from the tube EF; and at D there is a fourth, opening externally to discharge the air from the upper part. Plate CCXCVIII. fig. 1. Fig. 2.

The flexible tube EF, screwed on at the end CB, being introduced into one of the nostrils, whilst the mouth and the other nostril are closed by an assistant, if we separate the two handles LM, which were close together at the introduction of the tube, it is evident, that the air in the lungs will rush into the upper part through the valve C, whilst the external air will fill the lower part through the valve A: the two handles being

Lungs || Lupinus.

being again brought into contact, the atmospheric air will be forced into the lungs through the valve B, and at the same time the air in the upper part will be discharged at the valve D. Thus by the alternate play of the double bellows, the lungs will be alternately filled and emptied as in respiration. In using the instrument care should be taken not to be too violent; as the more perfectly the natural motion of respiration is imitated, the better.

To prevent any substances from without injuring the valves AD, fig. 1. the rim is made with a screw, B, fig. 3. in order to receive a cap AA, fig. 3. full of small holes. This screw has also another use. If air or oxygen gas be preferred, a bladder filled with it, fig. 4. may, by means of the screw A, be fastened to the valve A, fig. 1; and, to prevent waste, as this air may serve several times, a flexible tube may be screwed on the valve D, fig. 1. communicating with the bladder by means of the opening *d*, fig. 4: thus it may be employed as often as the operator thinks proper.

Fig. 3.

Fig. 4.

There is a handle K to the partition in the middle, in order that, if it be at any time necessary to use either of the divisions alone, the other may be confined from acting. *c*, *b*, fig. 5. represent the two valves to be applied at the end of the instrument C, B, fig. 1.; and fig. 6. is a section of the end CB, showing the valves in their proper places.

Fig. 5.

It is proper to add, that the capacity of the instrument should be proportioned to the quantity of air received into the lungs in inspiration, which Dr Goodwyn has ascertained to be twelve cubical inches or somewhat more. Each division of the instrument, therefore, should be capable of containing that quantity.

Lung-Wort. See PULMONARIA, BOTANY *Index.*

LUNISOLAR YEAR, in *Chronology*, the space of 532 common years; found by multiplying the cycle of the sun by that of the moon.

LUNULA. See LUNE.

LUPERCALIA, feasts instituted in ancient Rome, in honour of the god Pan. The word comes from *Lupercal*, the name of a place under the Palatine mountain, where the sacrifices were performed.

The Lupercalia were celebrated on the 15th of the kalends of March, that is, on the 15th of February, or, as Ovid observes, on the 3d day after the ides. They are supposed to have been established by Evander.

On the morning of this feast, the Luperci, or priests of Pan, ran naked through the streets of Rome, striking the married women they met on the hands and belly with a thong or strap of goats leather, which was held an omen promising them fecundity and happy deliveries. See LUPERCI.

This feast was abolished in the time of Augustus; but afterwards restored, and continued to the time of the emperor Anastasius.—Baronius says it was abolished by the pope in 496.

LUPERCI, a name given to the priests of the god Pan. See LUPERCALIA.

The *luperci* were the most ancient order of priests in Rome; they were divided into two colleges or companies, the one called *Fabii* and the other *Quintilii*. To these Cæsar added a third, which he called *Julii*.

LUPINUS, LUPINE; a genus of plants belonging to the diadelphia class; and in the natural method ranking under the 32d order, *Papilionaceæ*. See BOTANY *Index*.

Lupinus || Lusatia.

LUPULUS, the HOP plant. See HUMULUS, BOTANY *Index*.

LUPUS, the WOLF. See CANIS, MAMMALIA *Index*.

Lupus Marinus, the *Sea-wolf*, a fish. See ANARRHICAS, ICHTHYOLOGY *Index*.

LUPUS, in *Astronomy*. See ASTRONOMY *Index*.

LURCHER, a kind of hunting-dog, much like a mongrel greyhound, with pricked ears, a shagged coat, and generally of a yellowish white colour: they are very swift runners, so that if they get between the burrows and the conies they seldom miss; and this is their common practice in hunting; yet they use other subtilties, as the tumbler does, some of them bringing in their game, and those are the best. It is also observable, that a lurcher will run down a hare at stretch.

LURE, in falconry, a device of leather, in the shape of two wings, stuck with feathers, and baited with a piece of flesh, to call back a hawk when at considerable distance.

LURGAN, a town in the county of Armagh and province of Ulster in Ireland, 66 miles from Dublin. It is a flourishing town, agreeably situated in the midst of a much improved country; and the inhabitants are extensively engaged in the linen manufacture. It stands on a gentle eminence, about two miles from Lough-Neagh, of which it commands a most beautiful and extensive prospect. N. Lat. 54. 35. W. Long. 6. 31.

LORGAN-GREEN, a town of Ireland, in the county of Louth and province of Leinster, 37 miles from Dublin; a mile beyond which is a handsome seat of the earl of Charlemont.

LURIDÆ, the name of the 28th order in Linnæus's fragments of a natural method. See BOTANY, Natural Orders.

LUSATIA, a marquisate of Germany, in Upper Saxony, subject to Prussia; bounded to the east by Silesia, to the west by Misnia, to the south by Bohemia, and to the north by the marquisate of Brandenburgh. Till towards the middle of the 15th century, the Upper Lusatia was called the *Mark*, i. e. *the marquisate or the land of Budiszin and Gorlitz*; and the Lower only *Lusatia*, which it is said, in the Sclavonic, signifies "a woody or marshy country." The air of the Upper Lusatia, which is hilly or mountainous, is better than that of the lower, a great part of which is moorish and boggy. Both abound in wood, especially the Lower, and turf for fuel. The heathy and mountainous tracts are generally barren; but the lower champaign and marsh lands are tolerably fertile, producing pasture, wheat, rye, oats, barley, buck-wheat, pease, lentils, beans, and millet; together with flax, hops, tobacco, some white and red wine, and what is called *manna*. Of several of these articles, however, considerable quantities are imported. In this country are found also quarries of stone, medicinal springs, bastard diamonds, agates, and jaspers, earths and clays for tobacco-pipes and all sorts of earthen ware, alum, good iron stone, vitriolic and copper water; nor is it destitute of cattle, fish, and venison. The rivers Spree, the Schwarze or Black Elster, and the Pulznitz, have

APPARATUS *FOR INFLATING THE* LUNGS. *PLATE CCCVIII.*

Fig. 1.

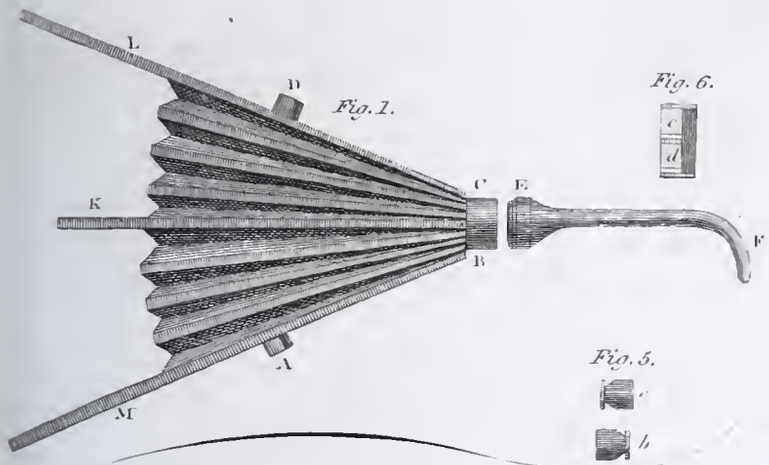


Fig. 6.

Fig. 2.

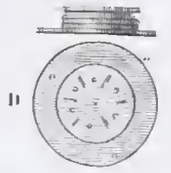


Fig. 3.

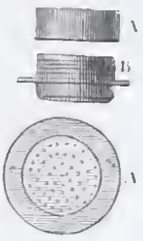
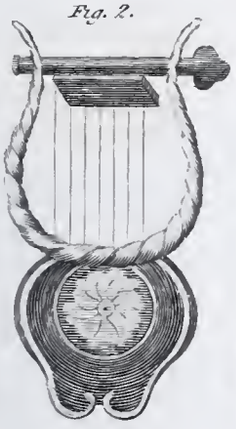


Fig. 4.

Fig. 5.

Fig. 1.

Fig. 2.



Ancient Lyres

Fig. 3.

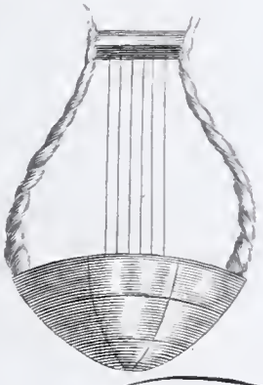


Fig. 4.

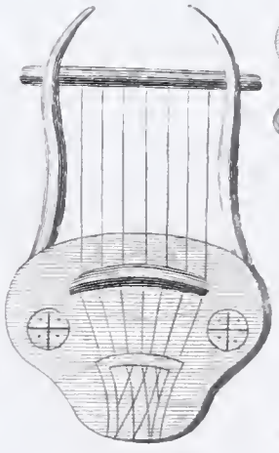
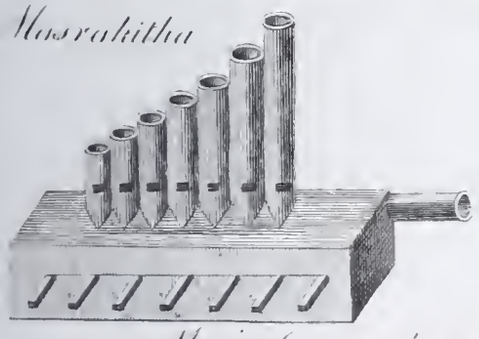


Fig. 5.

Fig. 6.

Nasrahitha

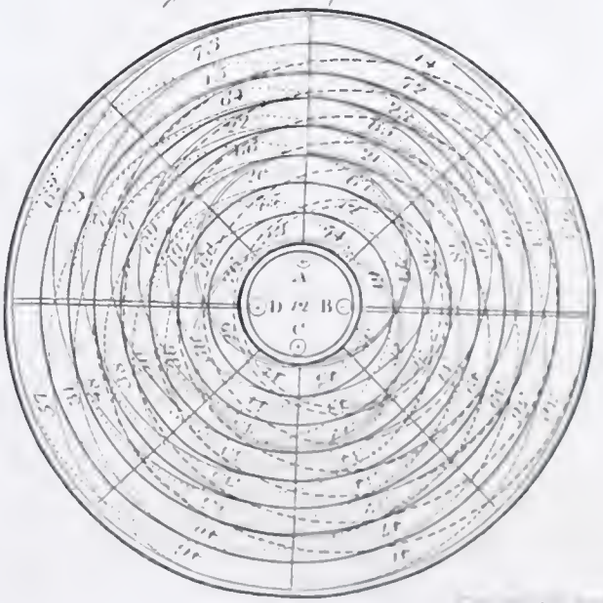


Mochud

Magic Square of Squares

200	217	232	248	8	25	40	57	72	89	104	121	136	153	168	185
58	331	26	7	250	229	218	39	250	167	154	135	122	103	90	71
198	219	230	251	6	27	38	59	70	91	102	123	134	155	166	187
60	37	28	5	242	229	220	197	188	165	156	133	124	101	92	69
209	216	233	248	9	24	41	56	73	88	105	120	137	152	169	184
55	42	23	10	247	234	215	202	183	170	151	138	119	106	87	74
203	214	235	246	11	22	43	54	75	86	107	118	139	150	171	182
53	44	21	12	245	236	213	204	181	172	149	140	117	108	85	76
205	212	237	244	13	20	45	52	77	84	109	116	141	148	173	180
51	46	19	14	243	238	211	206	179	174	147	142	115	110	83	78
207	210	239	242	15	18	47	50	79	82	111	114	143	146	175	178
49	48	17	16	241	240	209	208	177	176	145	144	113	112	81	80
196	221	228	253	4	29	36	61	68	93	100	125	132	157	164	189
62	35	30	3	254	227	222	195	190	163	158	131	126	99	94	67
194	223	226	255	2	31	34	63	66	95	98	127	130	159	162	191
64	33	32	1	252	225	224	193	192	161	160	129	128	97	96	65

Magic Circle of Circles



Lusatia. their sources in the Lusatias, which are also watered by the Neisse and Queis. The ancient inhabitants of this country were the Saxons, who were succeeded by the Vandals, and these by the Sober-Wends, a Sclavonian people. The present inhabitants, the descendants of the Wends, have an odd dress; and the language is so inarticulate and guttural, that it hath been said, it might be pronounced without lips, teeth, or tongue; but the towns are almost wholly peopled by Germans.

In the Upper Lusatia are six towns which appear at the land-diets, 16 smaller country towns, and four market towns. In the Lower are four diet towns, 13 country towns, and two market ones. Both marquisates were formerly subject either to the kings of Bohemia, the archdukes of Austria, or electors of Brandenburgh; but, in 1636, both were absolutely ceded to the elector of Saxony, in lieu of the 72 tons of gold which he expended in assisting the emperor Ferdinand II. against the Bohemians.

Christianity was first planted in Lusatia in the seventh century; but it was several centuries after that before Popery was fully established. In the 11th century many cloisters were erected in the country; but at the Reformation such numbers embraced Lutheranism, that it became the predominant religion, and still continues, though there are still several Roman Catholic foundations, churches, market-towns, and villages. The enthusiastic sect of Hernhuters possesses a great influence and esteem here. There are considerable manufactures of woollen and linen stuffs in the Lusatias, especially the Upper. At Budissen, and in the adjacent country, prodigious quantities of stockings, spatterdashes, caps, and gloves are made. The linen manufactures also flourish here, chiefly in the Upper Lusatia, where all sorts of linen are made, printed, and dyed. Exclusive of these, there are considerable manufactures of hats, leather, paper, gunpowder, iron, glass, bleached wax, &c. Though the demand and exportation of these commodities, particularly linen and woollens, is not so great as formerly, yet it is still considerable, and more than overbalances their importations in wool, yarn, silk, wines, spices, corn, fresh and baked fruits, garden stuff, and hops. Disputes of many years standing have subsisted between the country artificers and linen manufacturers on the one side, and the diet-towns on the other; the latter unjustly seeking to exclude the former from any share in the linen trade. The natives of this country are said to have quick natural parts, but to be sordidly penurious. We are told they observe the Saxon laws much better than they did the Bohemian. Learning hath been much esteemed and encouraged in both marquisates since the Reformation. The schools in the six diet towns of Upper Lusatia, particularly at Gorlitz, Budissen, and Zittau, greatly distinguish themselves, having handsome stipends. In Lower Lusatia also are some good schools, with stipends for the maintenance of students. Printing is said to be much followed, and brought to great perfection in this country.

In Upper Lusatia, the states consist, 1st, of those called *state-lords;* 2dly, of the prelates; 3dly, of the gentry and commonalty, under which are comprehended the counts, barons, nobles, and burgesses, possessors of fees and fief-estates; and, 4thly, of the representatives of the six principal towns. Without the consent of these states no taxes can be imposed, nor any thing of importance, that regards the public, transacted. The diets are ordinary or extraordinary. The ordinary meet once in three years, and the extraordinary when summoned by the sovereign upon particular emergencies. As to ecclesiastical matters, the dean of Budissen and his consistory exercise all manner of episcopal jurisdiction; and among the Protestants, the jurisdiction belongs either to the superior, the upper-office, or the patrons. The revenues arising to the superior or sovereign, from Upper Lusatia, consist partly of the subsidies granted by the states, among which, at present, are reckoned capitation and estate-money; and partly of the beer-tax, excise, tolls, &c. —Upper Lusatia is divided into two great circles, viz. those of Budissen and Gorlitz, which are again divided into lesser circles. Lusatia || Lustral.

The land states of Lower Lusatia consist, like those of the Upper, of prelates, lords, and knights, and the representatives of the state towns, which are Luckau, Gubben-Lubben, and Kalau. Two land diets are yearly held at Lubben, called *voluntary-diets;* but when the superior causes the states to be summoned together at his discretion, and propositions to be laid before them, by commissaries deputed for that purpose, such convention is called a *great land diet.* The marquisate is divided into five circles, each of which holds a circle assembled in its circle town. The chief officers appointed either by the superior or the states are, the president of the upper office, the land captain, and the land judge. The principal tribunals are, the land court, and the upper office, to which lie appeals from the inferior judicatories. There are also officers for the several circles. Spiritual matters belong here to a consistory, erected in 1668. The ordinary taxes are paid into the chest of the circle; and from thence consigned to the general chest, of which the upper tax-receiver is superintendant. By him an annual account of the receipts is made out, which is examined and passed by the deputies of the states.

LUSITANIA, in *Ancient Geography*, one of the divisions of Spain, extending to the north of the Tagus, quite to the sea of Cantabria, at least to the Promontorium Celticum. But Augustus, by a new regulation, made the Anas its boundary to the south, the Durius to the north; and thus constituting only a part of the modern Portugal. *Lusitani* the people, (Diodorus, Stephanus.)

LUSTRAL, an epithet given by the ancients to the water used in their ceremonies to sprinkle and purify the people. From them the Romanists have borrowed the holy water used in their churches.

Lustral Day (*Dies Lustricus*), that whereon the lustrations were performed for a child, and its name given; which was usually the ninth day from the birth of a boy, and the eighth from that of a girl. Though others performed the ceremony on the last day of that week wherein the child was born, and others on the fifth day from its birth.

Over this feast-day the goddess Nundina was supposed to preside; the midwives, nurses, and domestics handed the child backwards and forwards, around a fire burning on the altars of the gods, after which they sprinkled it with water; hence this feast had the name of

Lustral, Lustration.

of *amphidromia*. The old women mixed saliva and dust with the water. The whole ended with a sumptuous entertainment. The parents received gifts from their friends on this occasion. If the child was a male, their door was decked with an olive garland; if a female, with wool, denoting the work about which women were to be employed.

LUSTRATION, in antiquity, sacrifices or ceremonies by which the ancients purified their cities, fields, armies, or people, defiled by any crime or impurity. Some of these lustrations were public, others private. There were three species or manners of performing lustration, viz. by fire and sulphur, by water, and by air; which last was done by fanning and agitating the air round the thing to be purified. Some of these lustrations were necessary, i. e. could not be dispensed with; as lustrations of houses in time of a plague, or upon the death of any person: others again were done out of choice, and at pleasure. The public lustrations at Rome were celebrated every fifth year; in which they led a victim thrice round the place to be purified, and in the mean time burnt a great quantity of perfumes. Their country lustrations, which they called *ambarvalia*, were celebrated before they began to reap their corn: in those of the armies, which they called *armilustria*, some chosen soldiers, crowned with laurel, led the victims, which were a cow, a sheep, and a bull, thrice round the army ranged in battle-array in the field of Mars, to which deity the victims were afterwards sacrificed, after pouring out many imprecations upon the enemies of the Romans. The lustrations of their flocks were performed in this manner: the shepherd sprinkled them with pure water, and thrice surrounded his sheepfold with a composition of savin, laurel, and brimstone set on fire; and afterwards sacrificed to the goddess Pales an offering of milk boiled, wine, a cake, and millet. As for private houses, they were lustrated with water, a fumigation of laurel, juniper, olive tree, savin, and such like; and the victim commonly was a pig. Lustrations made for particular persons were commonly called *expiations*, and the victims *piacula*. There was also a kind of lustration used for infants, by which they were purified, girls the third, and boys the ninth, day after their birth; which ceremony was performed with pure water and spittle. See the article AMBARVALIA.—In their lustratory sacrifices, the Athenians sacrificed two men, one for the men of their city, and the other for the women. Divers of these expiations were austere: some fasted; others abstained from all sensual pleasures; and some, as the priests of Cybele, castrated themselves. The postures of the penitents were different according to the different sacrifices. The priests changed their habits according to the ceremony to be performed; white, purple, and black, were the most usual colours. They cast into the river, or at least out of the city, the animals or other things that had served for a lustration or sacrifice of atonement; and thought themselves threatened with some great misfortune when by chance they trod upon them. Part of these ceremonies were abolished by the emperor Constantine and his successors: the rest subsisted till the Gothic kings were masters of Rome; under whom they expired, excepting what the popes thought proper to adopt and bring into the church.

For the lustration, or rather expiation, of the ancient Jews, see EXPIATION.

Lustration || Lute.

LUSTRE, the gloss or brightness appearing on any thing, particularly on manufactures of silk, wool, or stuff. It is likewise used to denote the composition or manner of giving that gloss.

The lustre of silks is given them by washing in soap, then clear water, and dipping them in alum water cold. To give stuffs a beautiful lustre: For every eight pounds of stuff allow a quarter of a pound of linseed; boil it half an hour, and then strain it through a cloth, and let it stand till it is turned almost to a jelly: afterwards put an ounce and a half of gum to dissolve 24 hours; then mix the liquor, and put the cloth into this mixture; take it out, dry it in the shade, and press it. If once doing is not sufficient, repeat the operation. Curriers give a lustre to black leather first with juice of barberries, then with gum-arabic, ale, vinegar, and Flanders glue, boiled together. For coloured leather, they use the white of an egg beaten in water. Morocco have their lustre from juice of barberries, and lemon or orange. For hats, the lustre is frequently given with common water: sometimes a little black dye is added: the same lustre serves for furs, except that for very black furs they sometimes prepare a lustre of galls, copperas, Roman alum, ox's marrow, and other ingredients.

LUSTRE, an appellation given to a branched candlestick, when made of glass. See BRANCH and JESSE.

LUSTRINGS. A company was incorporated for making, dressing, and lustrating alamodes and lustrings in England, who were to have the sole benefit thereof, by stat. 4 and 5 William and Mary. And no foreign silks known by the name of *lustrings* or alamodes are to be imported but at the port of London, &c. Stat. 9 and 10 William III. c. 43. See SILK.

LUSTRUM, in Roman antiquity, a general muster and review of all the citizens and their goods, which was performed by the censors every fifth year, who afterwards made a solemn lustration. See the article LUSTRATION.

This custom was first instituted by Servius Tullius, about 180 years after the foundation of Rome. In course of time the lustra were not celebrated so often; for we find the fifth lustrum celebrated at Rome only in the 574th year of that city.

LUTE, or LOTING, among chemists, a mixed, tenacious, ductile substance, which grows solid by drying, and, being applied to the juncture of vessels, stops them up so as to prevent the air from getting in or out.

LUTE is also a musical instrument with strings. The lute consists of four parts, viz. the table, the body or belly, which has nine or ten sides: the neck, which has nine or ten stops or divisions, marked with strings: and the head or cross, where the screws for raising and lowering the strings to a proper pitch of tone are fixed. In the middle of the table there is a rose or passage for the sound; there is also a bridge that the strings are fastened to, and a piece of ivory between the head and the neck to which the other extremities of the strings are fitted. In playing, the strings are struck with the right hand, and with the left the stops are pressed. The lutes of Bologna are esteemed the best on account of the wood, which is said to have an uncommon disposition for producing a sweet sound.

LUTETIA,

Lutetia, Luther.

LUTETIA PARISIORUM, in *Ancient Geography*, a town of the Parisii, in Gallia Celtica, situated in an island in the Sequana or Seine. It received its name, as some suppose, from the quantity of clay, *lutum*, which is in its neighbourhood. J. Cæsar fortified and embellished it, from which circumstance some authors call it *Julii Civitas*. Julian the apostate resided there for some time. It is now *Paris*, the capital of France; so called from its name *Paryis* in the lower age.

LUTHER, MARTIN, the celebrated author of the Reformation, was a native of Eisleben in Saxony, and born in 1483. Though his parents were poor, he received a learned education; during the progress of which, he gave many indications of uncommon vigour and acuteness of genius. As his mind was naturally susceptible of serious impressions, and tinctured with somewhat of that religious melancholy which delights in the solitude and devotion of a monastic life, he retired into a convent of Augustinian friars; where he acquired great reputation, not only for piety, but for love of knowledge and unwearied application to study. The cause of this retirement is said to have been, that he was once struck by lightning, and his companion killed by his side by the same flash. He had been taught the scholastic philosophy which was in vogue in those days, and made considerable progress in it: but happening to find a copy of the Bible which lay neglected in the library of his monastery, he applied himself to the study of it with such eagerness and assiduity, as quite astonished the monks; and increased his reputation for sanctity so much, that he was chosen professor first of philosophy, and afterwards of theology, at Wittemberg on the Elbe, where Frederic elector of Saxony had founded an university.

While Luther continued to enjoy the highest reputation for sanctity and learning, Tetzel, a Dominican friar, came to Wittemberg in order to publish indulgences. Luther beheld his success with great concern; and having first inveighed against indulgences from the pulpit, he afterwards published 95 theses, containing his sentiments on that subject. These he proposed, not as points fully established, but as subjects of inquiry and disputation. He appointed a day on which the learned were invited to impugn them either in person or by writing; and to the whole he subjoined solemn protestations of his high respect for the apostolic see, and of his implicit submission to its authority. No opponent appeared at the time prefixed; the theses spread over Germany with astonishing rapidity, and were read with the greatest eagerness.

Though Luther met with no opposition for some little time after he began to publish his new doctrines, it was not long before many zealous champions arose to defend those opinions with which the wealth and power of the clergy were so strictly connected. Their cause, however, was by no means promoted by these endeavours; the people began to call in question even the authority of the canon law and of the pope himself.—The court of Rome at first despised these new doctrines and disputes; but at last the attention of the pope being raised by the great success of the reformer, and the complaints of his adversaries, Luther was summoned in the month of July 1518, to appear at Rome, within 60 days, before the auditor of the chamber. One of Luther's adversaries, named Prierias, who had written against him, was appointed to examine his doctrines, and to decide concerning them. The pope wrote at the same time to the elector of Saxony, beseeching him not to protect a man whose heretical and profane tenets were so shocking to pious ears; and enjoined the provincial of the Augustinians to check by his authority the rashness of an arrogant monk, which brought disgrace upon their order, and gave offence and disturbance to the whole church. Luther.

From these letters, and the appointment of his open enemy Prierias to be his judge, Luther easily saw what sentence he might expect at Rome; and therefore discovered the utmost solicitude to have his cause tried in Germany, and before a less suspected tribunal. He wrote a submissive letter to the pope, in which he promised an unreserved obedience to his will, for as yet he entertained no doubt of the divine original of the pope's authority; and by the intercession of the other professors, Cajetan, the pope's legate in Germany was appointed to hear and determine the cause. Luther appeared before him without hesitation: but Cajetan thought it below his dignity to dispute the point with a person so much his inferior in rank; and therefore required him by virtue of the apostolic powers with which he was clothed, to retract the errors which he had uttered with regard to indulgences and the nature of faith, and to abstain for the future from the publication of new and dangerous opinions; and at the last forbade him to appear in his presence, unless he proposed to comply with what had been required of him.

This haughty and violent manner of proceeding, together with some other circumstances, gave Luther's friends such strong reason to suspect that even the imperial safe-conduct would not be able to protect him from the legate's power and resentment, that they prevailed on him secretly to withdraw from Augsburg, where he had attended the legate, and to return to his own country. But before his departure, according to a form of which there had been some examples, he prepared a solemn appeal from the pope, ill-informed at that time concerning his cause, to the pope, when he should receive more full intimation with respect to it.—Cajetan, enraged at Luther's abrupt retreat, and at the publication of his appeal, wrote to the elector of Saxony, complaining of both; and requiring him, as he regarded the peace of the church, or the authority of its head, either to send that seditious monk a prisoner to Rome, or to banish him out of his territories. Frederick had hitherto, from political motives, protected Luther, as thinking he might be of use in checking the enormous power of the see of Rome, and though all Germany resounded with his fame; the elector had never yet admitted him into his presence. But upon this demand made by the cardinal, it became necessary to throw off somewhat of his former reserve. He had been at great expence and bestowed much attention on founding a new university, an object of considerable importance to every German prince; and foreseeing how fatal a blow the removal of Luther would be to its

Luther. reputation, he not only declined complying with either of the pope's requests, but openly discovered great concern for Luther's safety.

The situation of our reformer, in the mean time, came daily more and more alarming. He knew very well what were the motives which induced the elector to afford him protection, and that he could by no means depend on a continuance of his friendship. If he should be obliged to quit Saxony, he had no other asylum, and must stand exposed to whatever punishment the rage or bigotry of his enemies could inflict; and so ready were his adversaries to condemn him, that he had been declared a heretic at Rome before the expiration of the 60 days allowed him in the citation for making his appearance. Notwithstanding all this, however, he discovered no symptoms of timidity or remissness; but continued to vindicate his own conduct and opinions, and to inveigh against those of his adversaries with more vehemence than ever. Being convinced, therefore, that the pope would soon proceed to the most violent measures against him, he appealed to a general council, which he affirmed to be the representative of the Catholic church, and superior in power to the pope, who being a fallible man, might err, as St Peter, the most perfect of his predecessors, had done.

The court of Rome were equally assiduous in the mean time to crush the author of these new doctrines which gave them so much uneasiness. A bull was issued by the pope, of a date prior to Luther's appeal, in which he magnified the virtues of indulgences, and subjected to the heaviest ecclesiastical censures all who presumed to teach a contrary doctrine. Such a clear decision of the sovereign pontiff against him might have been very fatal to Luther's cause, had not the death of the emperor Maximilian, which happened on January 17. 1519, contributed to give matters a different turn. Both the principles and interest of Maximilian had prompted him to support the authority of the see of Rome; but, in consequence of his death, the vicariate of that part of Germany which is governed by the Saxon laws devolved to the elector of Saxony; and, under the shelter of his friendly administration, Luther himself enjoyed tranquillity; and his opinions took such root in different places, that they could never afterwards be eradicated. At the same time, as the election of an emperor was a point more interesting to the pope (Leo X.) than a theological controversy which he did not understand, and of which he could not foresee the consequences, he was so extremely solicitous not to irritate a prince of such considerable influence in the electoral college as Frederick, that he discovered a great unwillingness to pronounce the sentence of excommunication against Luther, which his adversaries continually demanded with the most clamorous importunity.

From the reason just now given, and Leo's natural aversion to severe measures, a suspension of proceeding against Luther took place for 18 months, though perpetual negociations were carried on during this interval in order to bring the matter to an amicable issue. The manner in which these were conducted having given our reformer many opportunities of observing the corruption of the court of Rome, its obstinacy in adhering to established errors, and its indifference about truth, however clearly proposed or strongly proved, he began, in 1520, to utter some doubts with regard to the divine original of the papal authority, which he publicly disputed with Eccius, one of his most learned and formidable antagonists. The dispute was indecisive, both parties claiming the victory; but it must have been very mortifying to the partizans of the Romish church to hear such an essential point of their doctrine publicly attacked. Luther.

The papal authority being once suspected, Luther proceeded to push on his inquiries and attacks from one doctrine to another, till at last he began to shake the firmest foundations on which the wealth and power of the church were established. Leo then began to perceive that there were no hopes of reclaiming such an incorrigible heretic; and therefore prepared to denounce the sentence of excommunication against him. The college of cardinals was often assembled, in order to prepare the sentence with due deliberation; and the ablest canonists were consulted how it might be expressed with unexceptionable formality. At last it was issued on the 15th of June 1520. Forty-one propositions, extracted out of Luther's works, were therein condemned as heretical, scandalous, and offensive to pious ears; all persons were forbidden to read his writings, upon pain of excommunication; such as had any of them in their custody were commanded to commit them to the flames; he himself, if he did not, within 60 days, publicly recant his errors, and burn his books, was pronounced an obstinate heretic, excommunicated, and delivered to Satan for the destruction of the flesh: and all secular princes were required, under pain of incurring the same censure, to seize his person, that he might be punished as his crimes deserved.

Luther was not in the least disconcerted by this sentence, which he had for some time expected. He renewed his appeal to a general council; declared the pope to be that antichrist, or man of sin, whose appearance is foretold in the New Testament; declaimed against his tyranny with greater vehemence than ever; and at last, by way of retaliation, having assembled all the professors and students in the university of Wittemberg, with great pomp, and in the presence of a vast multitude of spectators, he cast the volumes of the canon law, together with the bull of excommunication, into the flames. The manner in which this action was justified gave still more offence than the action itself. Having collected from the canon laws some of the most extravagant propositions with regard to the plenitude and omnipotence of the pope's power, as well as the subordination of all secular jurisdiction to his authority, he published these with a commentary, pointing out the impiety of such tenets, and their evident tendency to subvert all civil government.

On the accession of Charles V. to the empire, Luther found himself in a very dangerous situation. Charles, in order to secure the pope's friendship, had determined to treat him with great severity. His eagerness to gain this point, rendered him not averse to gratify the papal legates in Germany, who insisted, that without any delay or formal deliberation, the diet then sitting at Worms ought to condemn a man whom the pope had already excommunicated as an incorrigible heretic. Such an abrupt manner of proceeding, however, being deemed unprecedented and unjust by the members

Luther. members of the diet, they made a point of Luther's appearing in person, and declaring whether he adhered or not to those opinions which had drawn upon him the censures of the church. Not only the emperor, but all the princes through whose territories he had to pass, granted him a safe-conduct; and Charles wrote to him at the same time, requiring his immediate attendance on the diet, and renewing his promises of protection from any injury or violence. Luther did not hesitate one moment about yielding obedience; and set out for Worms, attended by the herald who had brought the emperor's letter and safe-conduct. While on his journey, many of his friends, whom the fate of Huss, under similar circumstances, and notwithstanding the same security of an imperial safe-conduct, filled with solicitude, advised and entreated him not to rush wantonly into the midst of danger. But Luther, superior to such terrors, silenced them with this reply, "I am lawfully called (said he) to appear in that city; and thither will I go in the name of the Lord, though as many devils as there are tiles on the houses were there combined against me."

The reception which he met with at Worms, was such as might have been reckoned a full reward of all his labours, if vanity and the love of applause had been the principles by which he was influenced. Greater crowds assembled to behold him than had appeared at the emperor's public entry; his apartments were daily filled with princes and personages of the highest rank; and he was treated with an homage more sincere, as well as more flattering, than any which preeminence in birth or condition can command. At his appearance before the diet, he behaved with great decency, and with equal firmness. He readily acknowledged an excess of acrimony and vehemence in his controversial writings; but refused to retract his opinions unless he were convinced of their falsehood, or to consent to their being tried by any other rule than the word of God. When neither threats nor intreaties could prevail on him to depart from this resolution, some of the ecclesiastics proposed to imitate the example of the council of Constance, and by punishing the author of this pestilent heresy, who was now in their power, to deliver the church at once from such an evil. But the members of the diet refusing to expose the German integrity to fresh reproach by a second violation of public faith, and Charles being no less unwilling to bring a stain upon the beginning of his administration by such an ignominious action, Luther was permitted to depart in safety. A few days after he left the city, a severe edict was published in the emperor's name, and by authority of the diet, depriving him, as an obstinate and excommunicated criminal, of all the privileges which he enjoyed as a subject of the empire, forbidding any prince to harbour or protect him, and requiring all to seize his person as soon as the term specified in his protection should be expired.

But this vigorous decree had no considerable effect; the execution of it being prevented partly by the multiplicity of occupations which the commotions in Spain, together with the wars in Italy and the Low Countries, created to the emperor; and partly by a prudent precaution employed by the elector of Saxony, Luther's faithful patron. As Luther, on his return from Worms, was passing near Altenstrain in Thuringia, a number of horsemen in masks rushed suddenly out of a wood, where the elector had appointed them to lie in wait for him, and surrounding his company, carried him, after dismissing all his attendants, to Wortburg, a strong castle not far distant. There the elector ordered him to be supplied with every thing necessary or agreeable; but the place of his retreat was carefully concealed, until the fury of the present storm against him began to abate, upon a change in the politieal system of Europe. In this solitude, where he remained nine months, and which he frequently called his *Patmos*, after the name of that island to which the apostle John was banished, he exerted his usual vigour and industry in defence of his doctrines, or in confutation of his adversaries, publishing several treatises, which revived the spirit of his followers, astonished to a great degree and disheartened at the sudden disappearance of their leader. Luther.

Luther, weary at length of his retirement, appeared publicly again at Wittemberg, upon the 6th of March 1522. He appeared indeed without the elector's leave; but immediately wrote him a letter to prevent his taking it ill. The edict of Charles V. as severe as it was, had given little or no check to Luther's doctrine; for the emperor was no sooner gone to Flanders, than his edict was neglected and despised, and the doctrine seemed to spread even faster than before. Carolostadius, in Luther's absence, had pushed things on faster than his leader; and had attempted to abolish the use of mass, to remove images out of the churches, to set aside auricular confession, invocation of saints, the abstaining from meats; had allowed the monks to leave their monasteries, to neglect their vows, and to marry; in short, had quite changed the doctrine and discipline of the church at Wittemberg: all which, though not against Luther's sentiments, was yet blamed by him, as being rashly and unseasonably done. Lutheranism was still confined to Germany: it was not got to France; and Henry VIII. of England made the most rigorous acts to hinder it from invading his realm. Nay, he did something more: to show his zeal for religion and the holy see, and perhaps his skill in theological learning, he wrote a treatise *Of the seven sacraments*, against Luther's book *Of the captivity of Babylon;* which he presented to Leo X. in October 1521. The pope received it very favourably; and was so well pleased with the king of England, that he complimented him with the title of *Defender of the Faith*. Luther, however, paid no regard to his kingship: but answered him with great sharpness, treating both his person and performance in the most contemptuous manner. Henry complained of Luther's rude usage of him to the princes of Saxony; and Fisher, bishop of Rochester, replied to his answer, in behalf of Henry's treatise: but neither the king's complaint, nor the bishop's reply, was attended with any visible effects.

Luther, though he had put a stop to the violent proceedings of Carolostadius, now made open war with the pope and bishops: and, that he might make the people despise their authority as much as possible, he wrote one book against the pope's bull, and another against the order falsely called the *order of bishops*. The same year, 1522, he wrote a letter, dated July the 29th to the assembly of the states of Bohemia; in

Luther. in which he assured them that he was labouring to establish their doctrine in Germany, and exhorted them not to return to the communion of the church of Rome; and he published also this year, a translation of the New Testament in the German tongue, which was afterwards corrected by himself and Melancthon. This translation having been printed several times, and being in every body's hands, Ferdinand archduke of Austria, the emperor's brother, made a very severe edict, to hinder the farther publication of it; and forbade all the subjects of his imperial majesty to have any copies of it, or of Luther's other books. Some other princes followed his example; and Luther was so angry at it, that he wrote a treatise *Of the secular power*, in which he accuses them of tyranny and impiety. The diet of the empire was held at Nuremberg, at the end of the year; to which Hadrian VI. sent his brief, dated November the 25th: for Leo X. died upon the 2d of December 1521, and Hadrian had been elected pope upon the 9th of January following. In this brief, among other things, he observes to the diet, how he had heard with grief, that Martin Luther, after the sentence of Leo X. which was ordered to be executed by the edict of Worms, continued to teach the same errors, and daily to publish books full of heresies: that it appeared strange to him, that so large and so religious a nation could be seduced by a wretched apostate friar: that nothing, however, could be more pernicious to Christendom; and that therefore he exhorts them to use their utmost endeavours to make Luther, and the authors of these tumults, return to their duty: or, if they refuse and continue obstinate, to proceed against them according to the laws of the empire, and the severity of the last edict.

The resolution of this diet was published in the form of an edict, upon the 6th of March 1523; but it had no effect in checking the Lutherans, who still went on in the same triumphant manner. This year Luther wrote a great many pieces: among the rest, one upon the dignity and office of the supreme magistrate; which Frederic elector of Saxony is said to have been highly pleased with. He sent, about the same time, a writing in the German language to the Waldenses, or Pickards, in Bohemia and Moravia, who had applied to him "about worshipping the body of Christ in the eucharist." He wrote also another book, which he dedicated to the senate and people of Prague, "about the institution of ministers of the church." He drew up a form of saying mass. He wrote a piece, entitled, *An example of Popish doctrine and divinity*; which Dupin calls *a satire against nuns and those who profess a monastic life*. He wrote also against the vows of virginity, in his preface to his commentary on 1 Cor. viii. And his exhortations here were, it seems, followed with effects; for soon after, nine nuns, among whom was Catharine de Bore, eloped from the nunnery at Nimptschen, and were brought, by the assistance of Leonard Coppen, a burgess of Torgau, to Wittemberg. Whatever offence this proceeding might give to the Papists, it was highly extolled by Luther; who, in a book written in the German language, compares the deliverance of these nuns from the slavery of a monastic life to that of the souls which Jesus Christ has delivered by his death. This year Luther had occasion to canonize two of his followers; who, as Melchior Adam relates, were burnt at Brussels in the beginning of July, and were the first who suffered martyrdom for his doctrine. He wrote also a consolatory epistle to three noble ladies at Misnia, who were banished from the duke of Saxony's court at Friburg, for reading his books. Luther

In the beginning of the year 1524, Clement VII. sent a legate into Germany to the diet, which was to be held at Nuremburg. Hadrian VI. died in October 1523, and was succeeded by Clement upon the 19th of November. A little before his death he canonized Benno, who was bishop of Meissen in the time of Gregory VII. and one of the most zealous defenders of the holy see. Luther, imagining that this was done directly to oppose him, drew up a piece with this title, *Against the New Idol and Old Devil set up at Meissen*; in which he treats the memory of Gregory with great freedom, and does not spare even Hadrian. Clement VII.'s legate represented to the diet of Nuremburg the necessity of enforcing the execution of the edict of Worms, which had been strangely neglected by the princes of the empire; but, notwithstanding the legate's solicitations, which were very pressing, the decrees of that diet were thought so ineffectual, that they were condemned at Rome, and rejected by the emperor. It was in this year that the dispute between Luther and Erasmus, about free-will, began. Erasmus had been much courted by the Papists to write against Luther; but he was all along of opinion, that writing would not be found an effectual way to end the differences and establish the peace of the church. However, tired out at length with the importunities of the pope and the Catholic princes, and desirous at the same time to clear himself from the suspicion of favouring a cause which he would not seem to favour, he resolved to write against Luther, though, as he tells Melancthon, it was with some reluctance, and chose free-will for the subject. His book was entitled, *A Diatriba, or Conference about Free-will*; and was written with much moderation, and without personal reflections. He tells Luther in the preface, "That he ought not to take his dissenting from him in opinion ill, because he had allowed himself the liberty of differing from the judgment of popes, councils, universities, and doctors of the church." Luther was some time before he answered Erasmus's book; but at last published a treatise *De Servo Arbitrio*, or *Of the Servitude of Man's Will*; and though Melancthon had promised Erasmus, that Luther should answer him with civility and moderation, yet Luther had so little regard to Melancthon's promise, that he never wrote any thing sharper. He accused Erasmus of being careless about religion, and little solicitous what became of it, provided the world continued in peace; and that his notions were rather philosophical than Christian. Erasmus immediately replied to Luther in a piece called *Hyperaspistes*; in the first part of which he answers his arguments, and in the second his personal reflections.

In October 1524, Luther threw off the monastic habit; which, though not premeditated and designed, was yet a very proper preparative to a step he took the year after; we mean, his marriage with Catharine de Bore. Catharine de Bore was a gentleman's daughter, who had been a nun, and was taken, as we have observed, out of the nunnery of Nimptschen, in the

year

Luther

year 1523. Luther had a design, as Melchior Adam related, to marry her to Glacius, a minister of Ortamunden; but she did not like Glacius; and so Luther married her himself upon the 13th of June 1525. This conduct of his was blamed not only by the Catholics, but, as Melanethon says, by those of his own party. He was even for some time ashamed of it himself; and owns, that his marriage had made him so despicable, that he hoped his humiliation would rejoice the angels, and vex the devils. Melanethon found him so afflicted with what he had done, that he wrote some letters of consolation to him. It was not so much the marriage, as the circumstances of the time, and the precipitation with which it was done, that occasioned the censures passed upon Luther. He married all of a sudden, and at a time when Germany was groaning under the miseries of a war which was said at least to be owing to Lutheranism. Then, again, it was thought an indecent thing in a man of 42 years of age, who was then, as he pretended, restoring the Gospel, and reforming mankind, to involve himself in marriage with a woman of 26, either through incontinence, or any account whatever. But Luther, as soon as he had recovered himself a little from this abashment, assumed his former air of intrepidity, and boldly supported what he had done with reasons. "I took a wife (says he), in obedience to my father's commands; and hastened the consummation, in order to prevent impediments, and stop the tongues of slanderers." It appears from his own confession, that this reformer was very fond of Mrs de Bore, and used to call her *his Catharine*, which made prophane people think and say wicked things of him: "And therefore (says he) I married of a sudden, not only that I might not be obliged to hear the clamours which I knew would be raised against me, but to stop the mouths of those who reproached me with Catharine de Bore." Luther also gives us to understand, that he did it partly as concurring with his grand scheme of opposing the Catholics.

Luther, notwithstanding, was not himself altogether satisfied with these reasons. He did not think the step he had taken could be sufficiently justified upon the principles of human prudence; and therefore we find him, in other places, endeavouring to account for it from a supernatural impulse. But whether there was any thing divine in it or not, Luther found himself extremely happy in his new state, and especially after his wife had brought him a son. "My rib Kate (says he in the joy of his heart) desires her compliments to you, and thanks you for the favour of your kind letter. She is very well, through God's mercy. She is obedient and complying with me in all things; and more agreeable, I thank God, than I could have expected; so that I would not change my poverty for the wealth of Crœsus." He was heard to say (Seckendorf tells us), that he would not exchange his wife for the kingdom of France, nor for the riches of the Venetians; and that for three reasons: Because she had been given him by God, at the time when he implored the assistance of the Holy Ghost, in finding a good wife; secondly, Because, though she was not without faults, yet she had fewer than other women; and, thirdly, Because she religiously observed the conjugal fidelity she owed him. There went at first a report, that Catharine de Bore was brought to bed soon after her marriage with Luther; but Erasmus, who had wrote that news to his friends, acknowledged the falsity of it a little after.

Luther.

His marriage, however, did not retard his activity and diligence in the work of reformation. He revised the Augsburg confession of faith, and apology for the Protestants, when the Protestant religion was first established on a firm basis. See PROTESTANTS and REFORMATION.

After this, Luther had little else to do than to sit down and contemplate the mighty work he had finished: for that a single monk should be able to give the church so rude a shock, that there needed but such another entirely to overthrow it, may very well seem a mighty work. He did indeed little else: for the remainder of his life was spent in exhorting princes, states, and universities, to confirm the reformation which had been brought about through him; and publishing from time to time such writings as might encourage, direct, and aid them in doing it. The emperor threatened temporal punishment with armies, and the pope eternal with bulls and anathemas; but Luther cared for none of their threats. His friend and coadjutor Melanethon was not so indifferent; for Melanethon had a great deal of softness, moderation, and diffidence in his make, which made him very uneasy, and even sorrowful, in the present disorders. Hence we find many of Luther's letters written on purpose to support and comfort him under these several distresses and anxieties.

In the year 1533, Luther wrote a consolatory epistle to the citizens of Oschatz, who had suffered some hardships for adhering to the Augsburg confession of faith: in which, among other things, he says, "The devil is the host, and the world is his inn; so that wherever you come, you shall be sure to find this ugly host." He had also about this time a terrible controversy with George duke of Saxony, who had such an aversion to Luther's doctrine, that he obliged his subjects to take an oath that they would never embrace it. However, 60 or 70 citizens of Leipsic were found to have deviated a little from the Catholic way in some point or other, and they were known previously to have consulted Luther about it; upon which George complained to the elector John, that Luther had not only abused his person, but also preached up rebellion among his subjects. The elector ordered Luther to be acquainted with this; and to be told at the same time, that if he did not clear himself of the charge, he could not possibly escape punishment. But Luther easily refuted the accusation, by proving, that he had been so far from stirring up his subjects against him, on the score of religion, that, on the contrary, he had exhorted them rather to undergo the greatest hardships, and even suffer themselves to be banished.

In the year 1534, the Bible translated by him into German was first printed, as the old privilege, dated at Bibliopolis, under the elector's hand, shows: and it was published the year after. He also published this year a book against masses and the consecration of priests, in which he relates a conference he had with the devil upon those points; for it is remarkable in Luther's whole history, that he never had any conflicts of any kind within, but the devil was always his antagonist.

Luther. gonist. In February 1537, an assembly was held at Smalkald about matters of religion, to which Luther and Melanethon were called. At this meeting Luther was seized with so grievous an illness, that there were no hopes of his recovery. He was afflicted with the stone, and had a stoppage of urine for 11 days. In this terrible condition he would needs undertake to travel, notwithstanding all that his friends could say or do to prevent him: his resolution, however, was attended with a good effect; for the night after his departure he began to be better. As he was carried along, he made his will, in which he bequeathed his detestation of Popery to his friends and brethren; agreeably to what he often used to say: *Pestis eram vivus, moriens ero mors tua, papa;* that is, "I was the plague of Popery in my life, and shall continue to be so in my death."

This year the pope and the court of Rome, finding it impossible to deal with the Protestants by force, began to have recourse to stratagem. They affected therefore to think, that though Luther had indeed carried things on with a high hand and to a violent extreme, yet what he had pleaded in defence of these measures was not entirely without foundation. They talked with a seeming show of moderation: and Pius III. who succeeded Clement VII. proposed a reformation first among themselves, and even went so far as to fix a place for a council to meet at for that purpose. But Luther treated this farce as it deserved to be treated; unmasked and detected it immediately; and, to ridicule it the more strongly, caused a picture to be drawn, in which was represented the pope seated on high upon a throne, some cardinals about him with foxes tails on, and seeming to evacuate upwards and downwards (*sursum deorsum repurgare*, as Melchior Adam expresses it). This was fixed over against the title-page, to let the readers see at once the scope and design of the book; which was, to expose that cunning and artifice with which those subtle politicians affected to cleanse and purify themselves from their errors and superstitions. Luther published about the same time A Confutation of the Pretended Grant of Constantine to Sylvester Bishop of Rome; and also some letters of John Huss, written from his prison at Constance to the Bohemians.

In this manner was Luther employed till his death, which happened in the year 1546. That year, accompanied by Melanethon, he paid a visit to his own country, which he had not seen for many years, and returned again in safety. But soon after he was called thither again by the earls of Mansfeldt, to compose some differences which had arisen about their boundaries. Luther had not been used to such matters; but because he was born at Eisleben, a town in the territory of Mansfeldt, he was willing to do his country what service he could, even in this way. Preaching his last sermon therefore at Wittemberg, upon the 17th of January, he set off on the 23d; and at Hall in Saxony lodged with Justus Jonas, with whom he staid three days, because the waters were out. Upon the 28th, he passed over the river with his three sons and Dr Jonas; and being in some danger, he said to the Doctor, "Do not you think it would rejoice the devil exceedingly, if I and you, and my three sons, should be drowned?" When he entered the territories of the earls of Mansfeldt, he was received by 100 horsemen or more, and conducted in a very honourable manner; but was at the same time so very ill, that it was feared he would die. He said, that these fits of sickness often came upon him when he had any great business to undertake: of this, however, he did not recover; but died upon the 18th of February, in the 63d year of his age. A little before he expired, he admonished those that were about him to pray to God for the propagation of the Gospel: "because (said he) the council of Trent, which had sat once or twice, and the pope, would devise strange things against it." Soon after, his body was put into a leaden coffin, and carried with funeral pomp to the church at Eisleben, when Dr Jonas preached a sermon upon the occasion. The earls of Mansfeldt desired that his body should be interred in their territories; but the elector of Saxony insisted upon his being brought back to Wittemberg; which was accordingly done: and there he was buried with the greatest pomp that perhaps ever happened to any private man. Princes, earls, nobles, and students without number, attended the procession; and Melanethon made his funeral oration. Luther.

A thousand lies were invented by the Papists about Luther's death. Some said that he died suddenly; others, that he killed himself; others, that the devil strangled him: others, that his corpse stunk so abominably, that they were forced to leave it in the way, as it was carried to be interred. Nay, lies were invented about his death, even while he was yet alive. Luther, however, to give the most effectual refutation of this account of his death, put forth an advertisement of his being alive; and, to be even with the Papists for the malice they had shown in this lie, wrote a book at the same time to prove, that "the papacy was founded by the devil."

Luther's works were collected after his death, and printed at Wittemberg in 7 vols. folio. Catharine de Bore survived her husband a few years; and continued the first year of her widowhood at Wittemberg, though Luther had advised her to seek another place of residence. She went from thence in the year 1547, when the town was surrendered to the emperor Charles V. Before her departure, she had received a present of 50 crowns from Christian III. king of Denmark; and the elector of Saxony, and the counts of Mansfeldt, gave her good tokens of their liberality. With these additions to what Luther had left her, she had wherewithal to maintain herself and her family handsomely. She returned to Wittemberg, when the town was restored to the elector; where she lived in a very devout and pious manner, till the plague obliged her to leave it again in the year 1552. She sold what she had at Wittemberg, and retired to Torgau, with a resolution to end her life there. An unfortunate mischance befel her in her journey thither, which proved fatal to her. The horses growing unruly, and attempting to run away, she leaped out of the vehicle she was conveyed in; and, by leaping, got a fall, of which she died about a quarter of a year after, at Torgau, upon the 20th of December 1552. She was buried there in the great church, where her tomb and epitaph are still to be seen; and the university of Wittemberg, which was then at Torgau because the plague raged at Wittem-

Luther || Luthern.

berg, made a public programma concerning the funeral pomp.

LUTHERANISM, the sentiments of Martin Luther with regard to religion. See LUTHER.

Lutheranism has undergone some alterations since the time of its founder.—Luther rejected the epistle of St James as inconsistent with the doctrine of St Paul, in relation to justification; he also set aside the Apocalypse: both which are now received as canonical in the Lutheran church.

Luther reduced the number of sacraments to two, viz. baptism, and the eucharist: but he believed the impanation, or consubstantiation, that is, that the matter of the bread and wine remain with the body and blood of Christ; and it is in this article that the main difference between the Lutherans and English churches consists.

Luther maintained the mass to be no sacrifice; exploded the adoration of the host, auricular confession, meritorious works, indulgences, purgatory, the worship of images, &c. which had been introduced in the corrupt times of the Romish church. He also opposed the doctrine of free will, maintained predestination, and asserted our justification to be solely by the imputation of the merits and satisfaction of Christ. He also opposed the fastings in the Roman church, monastical vows, the celibate of the clergy, &c.

LUTHERANS, the Christians who follow the opinions of Martin Luther, one of the principal reformers of the church in the 16th century. See LUTHER.

The Lutherans, of all Protestants, are those who differ least from the Romish church; as they affirm, that the body and blood of Christ are materially present in the sacrament of the Lord's supper, though in an incomprehensible manner; and likewise represent some religious rites and institutions, as the use of images in churches, the distinguishing vestments of the clergy, the private confession of sins, the use of wafers in the administration of the Lord's supper, the form of exorcism in the celebration of baptism, and other ceremonies of the like nature, as tolerable, and some of them as useful. The Lutherans maintain, with regard to the divine decrees, that they respect the salvation or misery of men, in consequence of a previous knowledge of their sentiments and characters, and not as free and unconditional, and as founded on the mere will of God. Towards the close of the last century, the Lutherans began to entertain a greater liberality of sentiment than they had before adopted; though in many places they persevered longer in severe and despotic principles than other Protestant churches. Their public teachers now enjoy an unbounded liberty of dissenting from the decisions of those symbols or creeds which were once deemed almost infallible rules of faith and practice, and of declaring their dissent in the manner they judge the most expedient. Mosheim attributes this change in their sentiments to the maxim which they generally adopted, that Christians were accountable to God alone for their religious opinions; and that no individual could be justly punished by the magistrate for his erroneous opinions, while he conducted himself like a virtuous and obedient subject, and made no attempts to disturb the peace and order of civil society.

LUTHERN, in *Architecture*, a kind of window over the cornice, in the roof of a building; standing perpendicularly over the naked of a wall, and serving to illuminate the upper story.

Luthern || Luxemburg.

Lutherns are of various forms; as square, semicircular, round, called *bull's eyes*, *flat arches*, &c.

LUTRA, in *Zoology*. See MUSTELA, MAMMALIA *Index*.

LUTTI, BENEDITTO, an eminent painter, born at Florence in 1666. He was the disciple of Antonio Dominico Gabiani, and his merit was judged equal to that of his master: he painted few beside easel pieces; and his works were much valued and sought for in England, France, and Germany. The emperor knighted him; and the elector of Mentz, together with his patent of knighthood, sent him a cross set with diamonds. Lutti was never satisfied in finishing his pictures; yet though he often retouched them, they never appeared laboured. He died in 1724.

LUTZEN, a town of Upper Saxony in Germany; famous for a battle fought here in 1632, when Gustavus Adolphus king of Sweden was killed. It is situated on the river Elster, in E. Long. 12. 37. N. Lat. 51. 20.

LUXATION, is when any bone is moved out of its place of articulation, so as to impede or destroy its proper office or motion. See SURGERY.

LUXEMBURG, a city in the kingdom of the Netherlands, and capital of a duchy of the same name. It is seated partly on a hill, and partly on a plain; it is very strong both by art and nature. It is but indifferently built, though there are some good stone houses in it. There is nothing very remarkable among the structures but the Jesuits church; which is a handsome edifice, after the modern taste. It was taken by Louis XIV. in 1684; who so augmented the fortifications, that it is now one of the strongest towns in Europe. It was ceded to Spain by the treaty of Ryswick; but the French took it again in 1701, and gave it up to the house of Austria by the treaty of Utrecht. It is 25 miles south-west of Treves, and 100 west of Mentz. E. Long. 6. 10. N. Lat. 49. 52.

LUXEMBURG, the duchy of, is one of the 17 provinces of the Netherlands. It is bounded on the east by the archbishopric of Treves; on the south by Lorrain; on the west, partly by Champagne, and partly by the bishopric of Liege, which likewise, with part of Limburg, bound it on the north. It lies in the forest of Ardenne, which is one of the most famous in Europe. In some places it is covered with mountains and woods, and in general it is fertile in corn and wine; and here are a great number of iron mines. The principal rivers are the Moselle, the Sour, the Ourte, and the Semoy. It was formerly divided between the Austrians and the French, but now forms part of the kingdom of the Netherlands.

LUXEMBURG, *Francois Henry de Montmorenci*, duke of, and marshal of France, a renowned general in the service of Louis XIV. was born in 1628. He was with the prince of Condé at the battle of Rocroy, in 1643; and in 1668 distinguished himself at the conquest of Franche Compté. In 1672, he commanded in chief the French army in Holland; when he defeated the enemy near Woerden and Bodegrave, and was universally admired for the fine retreat he made in 1673. He became marshal of France in 1675; gained the battle of Fleurs in 1690, that of Steenkirk

Luxemburg || Luxury.

in 1692, and that of Nerwind in 1693. He died in Versailles in 1695.

LUXURIANS FLOS, "a luxuriant or double flower;" a flower, some of whose parts are increased in number, to the diminution or entire exclusion of others.

The parts that are augmented or multiplied in luxuriant flowers, are the flower-cup and petals, which Linnæus considers as the teguments or covers of the flower; the parts that are diminished, or entirely excluded, are the stamina or chives, which the same author denominates the male organs of generation.

Luxuriance in flowers is capable of the three following varieties.

1. A flower is said to be MULTIPLIED (*flos multiplicatus*), when the increase of the petals is not such as to exclude all the stamina: in this sense, flowers are properly said to be double, triple, or quadruple, according to the number of multiplications of the petals.

2. A flower is said to be FULL (*flos plenus*), when, by the multiplication of the petals, all the stamina are excluded. Such are most of the double flowers that engage the attention of florists.

3. A flower is said to be PROLIFIC (*flos prolifer*), which produces flowers, and sometimes leaves, from its centre.

For a particular description of each of these kinds of luxuriance in flowers, see the articles *Multiplicatus Flos*, *Plenus Flos*, and *Prolifer Flos*.

Many natural orders of plants do not in any circumstances produce luxuriant flowers. Of this kind are the masqued flowers of Tournefort, excepting calve's-snout; the rough-leaved, umbelliferous, starry plants, and such as flower at the joints, of Ray: some umbelliferous flowers, however, are *prolific*.

The pea-bloom, or butterfly-shaped flowers, are rarely rendered double; some instances, however, of luxuriance, are observed in a species of lady's finger, coronilla, and broom.

All luxuriant flowers are vegetable monsters. Such as are perfectly full, by which we mean the greatest degree of luxuriance, cannot be propagated by seeds; because these, for want of impregnation, can never ripen. Full flowers therefore are very properly denominated by Linnæus *eunuchs*. This highest degree of luxuriance is very common in carnation, lychnis, anemone, stock, Indian cress, rose, marsh marigold, ranunculus, violet, peony, and narcissus.

Flowers which do not exclude all the stamina, perfect their seeds. Of this kind are poppy, fennel-flower, campanula, and some others.

Some flowers, as those of the water-lily, fig-marigold, and cactus, have many rows or series of petals, without the number of stamina being in the least diminished. Such flowers are by no means to be reckoned luxuriant, in the slightest degree.

Luxuriance in flowers is generally owing to excess of nourishment.

LUXURY; voluptuousness, or an extravagant indulgence in diet, dress, and equipage.

Luxury, among the Romans, prevailed to such a degree, that several laws were made to suppress, or at least limit it. The extravagance of the table began about the time of the battle of Actium, and continued in great excess till the reign of Galba. Peacocks, cranes of Malta, nightingales, venison, wild and tame fowl, were considered as delicacies. A profusion of provisions was the reigning taste. Whole wild boars were often served up, and sometimes they were filled with various small animals, and birds of different kinds: this dish they called the *Trojan horse*, in allusion to the wooden horse filled with soldiers. Fowls and game of all sorts were served up in whole pyramids, piled up in dishes as broad as moderate tables. Lucullus had a particular name for each apartment; and in whatever room he ordered his servants to prepare the entertainment, they knew by the direction the expence to which they were to go. When he supped in the Apollo, the expence was fixed at 50,000 *drachmæ*, that is 1250l. M. Antony provided eight boars for 12 guests. Vitellius had a large silver platter, said to have cost a million of *sesterces*, called *Minerva's buckler*. In this he blended together the livers of gilt-heads, the brains of pheasants and peacocks, the tongues of phenicopters, and the milts of lampreys. Caligula served up to his guests pearls of great value dissolved in vinegar; the same was done also by Clodius the son of Æsop the tragedian. Apicius laid aside 90,000,000 of *sesterces*, besides a mighty revenue, for no other purpose but to be sacrificed to luxury; finding himself involved in debt, he looked over his accounts, and though he had the sum of 10,000,000 of *sesterces* still left, he poisoned himself for fear of being starved to death. Luxury.

The Roman laws to restrain luxury were *Lex Orchia*, *Fannia*, *Didia*, *Licinia*, *Cornelia*, and many others: But all these were too little; for as riches increased amongst them, so did sensuality.

What were the ideas of luxury entertained in England about two centuries ago, may be gathered from the following passage of Holinshed; who, in a discourse prefixed to his History, speaking of the increase of luxury, says, "Neither do I speak this in reproach of any man, God is my judge; but to show, that I do rejoice rather to see how God has blessed us with his good gifts, and to behold how that in a time wherein all things are grown to the most excessive prices, we yet do find means to obtain and atchieve such furniture as heretofore was impossible. There are old men yet dwelling in the village where I remain, which have noted three things to be marvellously altered in England within their sound remembrance. One is the multitude of chimneys lately erected; whereas in their young days there were not above two or three, if so many, in most uplandish towns of the realm (the religious houses, and manor places of their lords, always excepted, and peradventure some great personages), but each made his fire against a reredoss [skreen] in the hall, where he dressed his meat and dined.—The second is the great amendment of lodging; for, said they, our fathers and we ourselves have lain full oft upon straw pallets covered only with a sheet, under coverlits made of a dogswaine or horharriots (to use their own terms), and a good log under their head instead of a bolster.—If it were so that the father or goodman of the house had a mattrass, or flock bed and sheets, a sack of chaff to rest his head upon, he thought himself to be as well lodged as the lord of the town. So well were they contented, that pillows (said they) were thought meet only

Luxury. only for women in childbed; as for servants, if they had any sheet above them it was well; for seldom had they any under their bodies to keep them from pricking straws, that ran oft through the canvas and their hardened hides.—The third thing they tell of, is the exchange of treene [wooden] platters into pewter, and wooden spoons into silver or tin; for so common were all sorts of treene vessels in old times, that a man should hardly find four pieces pewter (of which one was peradventure a salt) in a good farmer's house. Again, In times past, men were contented to dwell in houses builded of sallow, willow, &c. so that the use of oak was in a manner dedicated wholly unto churches, religious houses, princes palaces, navigation, &c. But now willow, &c. are rejected, and nothing but oak anywhere regarded; and yet see the change, for when our houses were builded of willow, then had we oaken men; but now that our houses are come to be made of oak, our men are not only become willow, but a great many altogether of straw, which is a sore alteration. In these the courage of the owner was a sufficient defence to keep the house in safety; but now the assurance of the timber must defend the men from robbing. Now have we many chimneys, and yet our tenderlins complain of rheums, catarrhs, and poses; then had we none but reredoses, and our heads did never ache. For as the smoke in those days were supposed to be sufficient hardening for the timber of the house; so it was reputed a far better medicine to keep the goodman and his family from the quacks or pose; wherewith, as then, very few were acquainted. Again, Our pewterers in time past employed the use of pewter only upon dishes and pots, and a few other trifles for service; whereas now they are grown into such exquisite cunning, that they can in a manner imitate by infusion any form or fashion of cup, dish, salt, bowl, or goblet, which is made by the goldsmith's craft, though they be ever so curious and very artificially forged. In some places beyond the sea, a garnish of good flat English pewter (I say flat, because dishes and platters in my time began to be made deep, and like basons, and are indeed more convenient both for sauce and keeping the meat warm) is esteemed so precious as the like number of vessels that are made of fine silver."

Particular instances of luxury, in *eating*, however, might be adduced from an earlier period, surpassing even the extravagance of the Romans. Thus, in the 10th year of the reign of Edward IV. (1470), George Nevill, brother to the earl of Warwick, at his instalment into the archiepiscopal see of York, entertained most of the nobility and principal clergy; when his bill of fare was 300 quarters of wheat, 350 tuns of ale, 104 tuns of wine, a pipe of spiced wine, 80 fat oxen, six wild bulls, 1004 weathers, 300 hogs, 300 calves, 3000 geese, 3000 capons, 300 pigs, 100 peacocks, 200 cranes, 200 kids, 2000 chickens, 4000 pigeons, 4000 rabbits, 204 bitterns, 4000 ducks, 200 pheasants, 500 partridges, 200 woodcocks, 400 plovers, 100 curlews, 100 quails, 1000 egrets, 200 rees, 400 bucks, does, and roebucks, 1506 hot venison pasties, 4000 cold ditto, 1000 dishes of jelly parted, 4000 dishes of jelly plain, 4000 cold custards, 2000 hot custards, 300 pikes, 300 breams, eight seals, four porpusses, 400 tarts. At this feast the earl of Warwick was steward, the earl of Bedford treasurer, and Lord Hastings comptroller, with many more noble officers; 1000 servitors, 62 cooks, 515 menial apparitors in the kitchen.—But such was the fortune of the man, that after his extreme prodigality he died in the most abject but unpitied poverty, *victus jacuit in summa inopia*. Luxury

And as to *dress*, luxury in that article seems to have attained a great height long before Holinshed's time: For in the reign of Edward III. we find no fewer than seven sumptuary laws passed in one session of parliament to restrain it. It was enacted, that men servants of lords, as also of tradesmen and artisans, shall be content with one meal of fish or flesh every day; and the other meals, daily, shall be of milk, cheese, butter and the like. Neither shall they use any ornaments of gold, silk, or embroidery; nor their wives and daughters any veils above the price of twelvepence. Artisans and yeomen shall not wear cloth above 40s. the whole piece (the finest then being about 6l. per piece), nor the ornaments before named. Nor the women any veils of silk, but only those of thread made in England. Gentlemen under the degree of knights, not having 100l. yearly in land, shall not wear any cloth above $4\frac{1}{2}$ marks the whole piece. Neither shall they or their females use cloth of gold, silver, or embroidery, &c. But esquires having 200l. per annum or upwards of rent, may wear cloths of five marks the whole piece of cloth; and they and their females may also wear stuff of silk, silver, ribbons, girdles, or furs. Merchants, citizens, burghers, and artificers or tradesmen, as well of London as elsewhere, who have goods and chattels of the clear value of 500l. and their females, may wear as is allowed to gentlemen and esquires of 100l. per annum. And merchants, citizens, and burgesses, worth above 1000l. in goods and chattels, may (and their females) wear the same as gentlemen of 200l. per annum. Knights of 200 marks yearly may wear cloth of six marks the cloth, but no higher; but no cloth of gold, nor furred with ermine: but all knights and ladies having above 400 marks yearly, up to 1000l. per annum, may wear as they please, ermine excepted; and they may wear ornaments of pearl and precious stones for their heads only. Clerks having degrees in cathedrals, colleges, &c. may wear as knights and esquires of the same income. Plowmen, carters, shepherds, and such like, not having 40s. value in goods or chattels, shall wear no sort of cloth but blanket and russet lawn of 12d. and shall wear girdles and belts; and they shall only eat and drink suitable to their stations. And whosoever uses other apparel than is prescribed by the above laws shall forfeit the same.

Concerning the general utility of luxury to a state, there is much difference of opinion among political writers. Baron Montesquieu asserts, that luxury is necessary in monarchies, as in France; but ruinous to democracies, as in Holland. With regard therefore to Britain, whose government is compounded of both species, it is held to be a dubious question, how far private luxury is a public evil; and, as such, cognizable by public laws. And indeed our legislators have several times changed their sentiments as to this point; for formerly there were a number of penal laws existing to restrain excess in apparel, chiefly made in the reigns of Edward III. IV. and Henry VIII. a specimen of which we have inserted above. But all of them it appeared expedient to repeal at an after period. In fact, although

Luxury || Lycaon.

luxury will of necessity increase according to the influx of wealth, it may not be for the general benefit of commerce to impose, as in the above cited laws, an absolute prohibition of every degree of it; yet, for the good of the public, it may be necessary that such as go beyond proper bounds in eating, drinking, and wearing what by no means is suitable to their station, should be taxed accordingly, could it be done without including those who have a better title to such indulgence. This is certainly, however, a point which should be maturely weighed before executed; and, in mercantile countries at least, such restraints may be found prejudicial, most likely impracticable, especially where true liberty is established. Sir William Temple observes, speaking of the trade and riches, and at the same time of the *frugality* of the Hollanders, "That some of our maxims are not so *certain* as *current* in politics: as that encouragement of excess and luxury if employed in the consumption of *native* commodities, is of advantage to trade. It may be so to that which impoverishes, but not to that which enriches a country. It is indeed less prejudicial, if it lies in *native* than in *foreign* wares: but the humour of *luxury* and expence cannot stop at certain bounds; what begins in *native* will proceed to *foreign* commodities; and though the example arise among idle persons, yet the imitation will run into all degrees, even of those men by whose industry the nation subsists. And besides, the more of *our own* we spend, the less shall we have to send abroad; and so it will come to pass, that while we drive a vast trade, yet, by buying much more than we *sell*, we shall come to be poor at last."

LYBIA, or LIBYA, a name anciently given to all that part of Africa lying between the border of Egypt and the river Triton; and comprehending *Cyrenaica*, *Marmarica*, and the Regio *Syrtica*. See these articles.

LYCÆUM, Λυκειον, in antiquity, the name of a celebrated school or academy at Athens, where Aristotle explained his philosophy. The place was composed of porticoes and trees planted in the quincunx form, where the philosophers disputed walking. Hence *philosophy of the Lycæum* is used to signify the philosophy of Aristotle, or the Peripatetic philosophy. Suidas observes, that the Lycæum took its name from its having been originally a temple of Apollo Lycæus; or rather a portico or gallery built by Lycæus son of Apollo; but others mention it to have been built by Pisistratus or Pericles.

LYCÆUS, in *Ancient Geography*, a mountain of Arcadia, sacred to Jupiter; whence *Jupiter Lycæus* (Pliny). Sacred also to Pan (Virgil); and hence *Lycæa*, the rites performed to Pan on this mountain; which Evander carrying with him to Latium, were called *Lupercalia* (Virgil).

LYCAON, in fabulous history, the first king of Arcadia, son of Pelasgus and Melibœa. He built a town called Lycosura, on the top of Mount Lycæus, in honour of Jupiter. He had many wives, by whom he had a daughter called Callisto, and 50 sons. He was succeeded on the throne by Nyctimus, the eldest of his sons. He lived about 1820 years before the Christian era.—Another king of Arcadia, celebrated for his cruelties. He was changed into a wolf by Jupiter, because he offered human victims on the altar of the god Pan. Some attribute this metamorphosis to another cause. The sins of mankind, as they relate, were become so enormous, that Jupiter visited the earth to punish wickedness and impiety. He came to Arcadia, where he was announced as a god, and the people began to pay proper adoration to his divinity. Lycaon, however, who used to sacrifice all strangers to his wanton cruelty, laughed at the pious prayers of his subjects; and to try the divinity of the god, he served up human flesh on his table. This impiety so irritated Jupiter, that he immediately destroyed the house of Lycaon, and changed him into a wolf.

Lycaon || Lycomedes

LYCAONIA, in *Ancient Geography*, a small country of the Hither Asia, contained between Pamphylia to the south, Cappadocia to the north, Pisidia and Phrygia to the west, and Armenia Minor to the east. *Lycaones*, the people. This country, though situated very near Mount Taurus, and part of it on it, yet the Romans reckoned it in Asia intra Taurum. *Arcadia*, anciently called *Lycaonia* (Stephanus.)—Also an island in the Tiber, joined to Rome by a bridge, and to the land by another, namely, the Cestius and Fabricius.

LYCHNIS, CAMPION, including also *Catch-fly*, &c.; a genus of plants belonging to the decandria class, and order pentagynia; and in the natural method ranking under the 22d order, *Caryophyllæ*. See BOTANY *Index*.

LYCIA, a country of Asia Minor, bounded by the Mediterranean on the south, Caria on the west, Pamphylia on the east, and Phrygia on the north. It was anciently called *Milyas* and *Tremile*, from the Milyæ, or Solymi, a people of Crete, who came to settle there. The country received the name of *Lycia* from Lycus the son of Pandion, who established himself there. The inhabitants have been greatly commended by all the ancients for their sobriety and justice. They were conquered by Crœsus king of Lydia, and afterwards by Cyrus. Though they were subject to the power of Persia, yet they were governed by their own kings, and only paid a yearly tribute to the Persian monarch. They became part of the Macedonian empire when Alexander came into the east, and afterwards were ceded to the house of the Seleucidæ. The country was reduced into a Roman province by the emperor Claudius.

LYCIUM, a genus of plants belonging to the pentandria class; and in the natural method ranking under the 28th order, *Luridæ*. See BOTANY *Index*.

LYCODONTES, the petrified teeth of the lupus-piscis, or wolf-fish, frequently found fossil. They are of different shapes; but the most common kind rise into a semiorbicular form, and are hollow within, somewhat resembling an acorn-cup; this hollow is found sometimes empty, and sometimes filled with the stratum in which it is immersed. Many of them have an outer circle of a different colour from the rest.

LYCOMEDES, in fabulous history, a king of Scyros, an island in the Ægean sea. He was son of Apollo and Parthenope. He was secretly intrusted with the care of young Achilles, whom his mother Thetis had disguised in woman's clothes, to remove him from the Trojan war, where she knew he must unavoidably perish. Lycomedes has rendered himself famous for his treachery to Theseus, who had implored his protection when

Lycomedes || Lycurgus.

when driven from his throne of Athens by the usurper Mnestheus. Lycomedes, as it is reported, either envious of the fame of his illustrious guest, or bribed by the emissaries of Mnestheus, led Theseus to an elevated place, on pretence to show him the extent of his dominions, and perfidiously threw him down a precipice, where he was killed.

LYCOPERDON, a genus of plants belonging to the cryptogamia class. See BOTANY *Index*.

LYCOPERSICON. See SOLANUM, BOTANY *Index*.

LYCOPHRON, a famous Greek poet and grammarian, born at Colchis in Eubœa, flourished about 304 B. C. and, according to Ovid, was killed by an arrow. He wrote 20 tragedies; but all his works are lost, except a poem entitled *Cassandra*, which contains a long train of predictions, which he supposes to have been made by Cassandra, Priam's daughter. This poem is extremely obscure. The best edition of it is that of Dr Potter, printed at Oxford in 1697, folio.

LYCOPODIUM, or CLUB-MOSS; a genus of plants belonging to the cryptogamia class. See BOTANY *Index*.

LYCOPOLIS, or LYCON, in *Ancient Geography*, so called from the worship of wolves. *Lycopolitæ*, the people; *Lycopolites*, the district. There were two towns of this name, one in the Delta, or Lower Egypt, near the Mediterranean; the other in the Thebais, or Higher Egypt, in the northern part, to the west of the Nile.

LYCOPSIS, a genus of plants belonging to the pentandria class; and in the natural method ranking under the 41st order, *Asperifoliæ*. See BOTANY *Index*.

LYCOPUS, a genus of plants belonging to the diandria class; and in the natural method ranking under the 42d order, *Verticillatæ*. See BOTANY *Index*.

LYCURGIA, a festival observed by the Spartans, in memory of their lawgiver Lycurgus, whom they honoured with a temple and anniversary sacrifice.

LYCURGUS, the celebrated legislator of the Spartans, was the son of Eunomes king of Sparta.—He travelled to Greece to the isle of Crete, to Egypt, and even to the Indies, to converse with the sages and learned men of those countries, and to learn their manners, their customs, and their laws. After the death of his brother Polydectes, who was king of Sparta, his widow offered the crown to Lycurgus, promising that she would make herself miscarry of the child of which she was pregnant, provided he would marry her; but Lycurgus nobly refused these advantageous offers, and afterwards contented himself with being tutor to his nephew Charillus, and restored to him the government when he came of age; but notwithstanding this regular and generous conduct, he was accused of a design to usurp the crown. This calumny obliged him to retire to the island of Crete, where he applied himself to the study of the laws and customs of nations. At his return to Lacedæmon, he reformed the government: and, to prevent the disorders occasioned by luxury and the love of riches, he prohibited the use of gold and silver; placed all the citizens in a state of equality; and introduced the strictest temperance, the most exact discipline, and those admirable laws which (a few excepted) have been celebrated by all historians. It is said, that, to engage the Lacedæmonians to observe them inviolably, he made them promise with an oath not to change any part of them till his return; and that he afterwards went to the island of Crete, where he killed himself, after having ordered that his ashes should be thrown into the sea, for fear lest if his body should be carried to Sparta the Lacedæmonians would think themselves absolved from their oath. He flourished about 870 B. C.

Lycurgus || Lydia.

LYDD, a town of England, in Kent, two miles and a half south-west of Romney, of which town and port it is a member, and 71 miles from London. It is a populous town, and is incorporated by the name of a bailiff, jurats, and commonalty. In the beach near Stone-end, is a heap of stones, fancied to be the tomb of Crispin and Crispianus; and near the sea is a place called *Holmstone*, consisting of beach and pebble-stones, which abounds with holm trees.

LYDGATE, JOHN, called the *Monk of Bury*; not, as Cibber conjectures, because he was a native of that place, for he was born about the year 1380, in the village of Lydgate: but because he was a monk of the Benedictine convent at St Edmund's-Bury. After studying some time in our English universities, he travellen to France and Italy: and, having acquired a competent knowledge of the languages of those countries, he returned to London, where he opened a school, in which he instructed the sons of the nobility in polite literature. At what time he retired to the convent of St Edmund's-Bury, does not appear; but he was certainly there in 1415. He was living in 1446, aged about 66; but in what year he died is not known. Lydgate, according to Pits, was an elegant poet, a persuasive rhetorician, an expert mathematician, an acute philosopher, and a tolerable divine. He was a voluminous writer; and, considering the age in which he lived, an excellent poet. His language is less obsolete, and his versification much more harmonious, than the language and versification of Chaucer, who wrote about half a century before him. He wrote, 1. History of the Theban war, printed at the end of Chaucer's works, 1561, 1602, 1687. 2. Poemation of good counsel; at the end of Chaucer's works. 3. The life of Hector; London 1594, folio, printed by Gross, dedicated to Henry V. 4. Life of the blessed Virgin; printed by Caxton. 5. The proverbs of Lydgate upon the fall of princes; printed by Wink. Word, London, 4to. 6. Dispute of the horse, the sheep, and the goose; printed in Caxton's Collect. 4to. 7. The temple of brass; among the works of Chaucer. 8. London lickpenny; vide Stow's history, &c. &c. Besides an incredible number of other poems and translations preserved in various libraries, and of which the reader will find a catalogue in Bishop Tanner.

LYDIA, in *Ancient Geography*, a celebrated kingdom of Asia Minor.—All the ancient writers tell us, that Lydia was first called *Mæonia* or *Meonia*, from Meon king of Phrygia and Lydia; and that it was known under no other denomination till the reign of Atys, when it began to be called *Lydia* from his son Lydus. Bochart finding in his learned collection of Phœnician words the verb *lud*, signifying "to wind," and observing that the country we are speaking of is watered by the Mæander so famous for its windings, concludes that it was thence named *Lydia*, or *Ludia*.

Lydia. As to the ancient name of Mæonia, he takes it to be a Greek translation of the Phœnician word *lud;* wherein he agrees in some measure with Stephanus, who derives the name of Mæonia from Mæon the ancient name of the Mæander. Some take the word *mæonia* to be a translation of a Hebrew word signifying "metal," because that country, say they, was in former times enriched above any other with mines. Though Lydia and Mæonia are by most authors indifferently used for one and the same country, yet they are sometimes distinguished; that part where Mount Tmolus stood, watered by the Pactolus, being properly called *Mæonia;* and the other, lying on the coast, *Lydia*. This distinction is used by Homer, Callimachus, Dionysius, and other ancient writers. In after ages, when the Ionians, who had planted a colony on the coast of the Egean sea, began to make some figure, that part was called *Ionia*, and the name of *Lydia* given to the ancient Mæonia.—Lydia, according to Pliny, Ptolemy, and other ancient geographers, was bounded by Mysia Major on the north, by Caria on the south, by Phrygia Major on the east, and Ionia on the west, lying between the 37th and 39th degrees of north latitude. What the ancients style the kingdom of *Lydia* was not confined within these narrow boundaries, but extended from Halys to the Egean sea. Pliny's description includes Æolia, lying between the Hermus and the Caïcus.

As to the origin of the Lydians, Josephus, and after him all the ecclesiastical writers, derive them from Lud, Shem's fourth son; but this opinion has no other foundation than the similitude of names. Some of the ancients will have the Lydians to be a mixed colony of Phrygians, Mysians, and Carians. Others finding some conformity in religion and religious ceremonies between the Egyptians and Tuscans who were a Lydian colony, conclude them, without any farther evidence, to be originally Egyptians. All we know for certain is, that the Lydians were a very ancient nation, as is manifest from their very fables; for Atys, Tantalus, Pelops, Niobe, and Arachne, are all said to have been the children of Lydus. And Zanthus in his *Lydiacá*, quoted by Stephanus, informs us, that the ancient city of Ascalon, one of the five satrapies of the Philistines, mentioned in the books of Joshua and the Judges, was built by one Ascalus a Lydian, whom Achiamus king of Lydia had appointed to command a body of troops which he sent, we know not on what occasion, into Syria. The Heraclidæ, or kings of Lydia descended from Hercules, began to reign before the Trojan war; and had been preceded by a long series of sovereigns sprung from Atys, and hence styled *Atyadæ;* a strong proof of the antiquity of that kingdom.

The Lydians began very early to be ruled by kings, whose government seems to have been truly despotic, and the crown hereditary. We read of three distinct races of kings reigning over Lydia, viz. the Atyadæ, the Heraclidæ, and the Mermnadæ.

The *Atyadæ* were so called from Atys the son of Cotys, and grandson of Manes the first Lydian king. But the history of this family is obscure and fabulous.

The Atyadæ were succeeded by the *Heraclidæ*, or the descendants of Hercules. For Hercules being, by the direction of the oracle, sold as a slave to Omphale a queen of Lydia, to expiate the murder of Iphitus, had, during his captivity, by one of her slaves, a son named *Cleolaus*, whose grandson Argon was the first of the Heraclidæ that ascended the throne of Lydia. This race is said to have reigned 505 years; the son succeeding the father for 22 generations. They began to reign about the time of the Trojan war. The last of the family was the unhappy Candaules, who lost both his life and kingdom by his imprudence: an event of which we have the following account by Herodotus. Candaules had a wife whom he passionately loved, and believed the most beautiful of her sex. He extolled her charms to Gyges his favourite, whom he used to intrust with his most important affairs; and the more to convince him of her beauty, resolved to show her to him quite naked; he accordingly placed him in the porch of her chamber where the queen used to undress when she went to bed, ordering him to retire after he should have seen her, and take all possible care not to be observed. But notwithstanding all the caution he could use, she plainly discovered him going out; and though she did not doubt but it was her husband's contrivance, yet she passed that night in a seeming tranquillity, suppressing her resentment till next morning, when she sent for Gyges, and resolutely told him that he must either by his death atone for the criminal action he had been guilty of, or put to death Candaules the contriver of it, and receive both her and the kingdom of Lydia for his reward. Gyges at first earnestly begged of her that she would not drive him to the necessity of such a choice. But finding that he could not prevail with her, and that he must either kill his master or die himself, he chose the former part of the alternative. Being led by the queen to the same place where her husband had posted him the night before, he stabbed the king while he was asleep, married the queen, and took possession of the kingdom, in which he was confirmed by the answer of the Delphic oracle. The Lydians having taken up arms to revenge the death of their prince, an agreement was made between them and the followers of Gyges, that if the oracle should declare him to be lawful king of Lydia, he should be permitted to reign; if not, he should resign the crown to the Heraclidæ. The answer of the oracle proving favourable to Gyges, he was universally acknowledged for lawful king of Lydia. Candaules is said to have purchased a picture painted by Bularchas, representing a battle of the Magnetes, for its weight in gold; a circumstance which shows how early the art of painting began to be in request, for Candaules was cotemporary with Romulus. Lydia.

Gyges having thus possessed himself of the kingdom of Lydia, sent many rich and valuable presents to the oracle of Delphos; among others, six cups of gold weighing 30 talents, and greatly esteemed for the workmanship. He made war on Miletus and Smyrna, took the city of Colophon, and subdued the whole country of Troas. In his reign, and by his permission, the city of Abydus was built by the Milesians. Plutarch and other writers relate his accession to the crown of Lydia in a quite different manner, and tell us, without making any mention of the queen, that Gyges rebelled against Candaules and slew him in an engagement. In Gyges began the third

race,

Lydia. race, called *Hermnadæ;* who were also, properly speaking, Heraclidæ, being descended from a son of Hercules by Omphale. Gyges reigned 38 years, and was succeeded by his son Ardyes.

This prince carried on the war against the Milesians which his father had begun, and possessed himself of Priene, in those days a strong city. In his reign the Cimmerians invaded and overran all Asia Minor; but what battles were fought against the Lydians and these invaders, and with what success, we find no where mentioned. Herodotus only informs us, that in the time of Ardyes they possessed themselves of Sardis, the metropolis of Lydia, but could never reduce the castle. Ardyes reigned 49 years, and was succeeded by his son Sadyattes, who reigned 12 years, and warred most part of his reign with the Milesians.

After him came his son Alyattes, who for the space of five years continued the war which his father had begun against the Milesians, ravaging their country, and about harvest time carrying away all their corn yearly, in order to oblige them, for want of provisions, to surrender their city, which he knew he could not reduce any other way, the Milesians being at that time masters of the sea. In the 12th year of this war the Lydians having set fire to the corn in the fields, the flames were carried by a violent wind, which happened to blow at that time, to the temple of Minerva at Assesus, and burnt it down to the ground. Not long after, Alyattes falling sick, sent to consult the oracle at Delphos; which refused to return any answer till such time as the king should rebuild the temple of Minerva at Assesus. Alyattes, thus warned, despatched ambassadors to Miletus, enjoining them to conclude a truce with the Milesians till the temple should be rebuilt. On the arrival of the ambassadors, Thrasybulus, then king of Miletus, commanded all the corn that was at that time in the city to be brought into the market-place, ordering the citizens to banquet in public, and revel as if the city were plentifully stored with all manner of provisions. This stratagem Thrasybulus practised, to the end that the ambassadors seeing such quantities of corn, and the people everywhere diverting themselves, might acquaint their master with their affluence, and divert him from pursuing the war. As Thrasybulus had designed, so it happened; for Alyattes, who believed the Milesians greatly distressed for provisions, receiving a different account from his ambassadors, changed the truce into a lasting peace, and ever afterwards lived in amity and friendship with Thrasybulus and the Milesians. He was succeeded, after a reign of 57 years, by his son Crœsus, whose uninterrupted prosperity, in the first years of his reign, far eclipsed the glory of his predecessors. He was the first that made war on the Ephesians, whose city he besieged and took, notwithstanding their consecrating it to Diana, and fastening the walls by a rope to her temple, which was seven stadia distant from the city. After the reduction of Ephesus, he attacked, under various pretences, the Ionians and Æolians, obliging them, and all the other Greek states of Asia, to pay him a yearly tribute. Having met with such extraordinary success by land, the Lydian prince determined to render his power equally conspicuous by sea. For this purpose he thought seriously of equipping a fleet; with which he purposed to invade and conquer the Grecian islands directly fronting his dominions. But this design, which, considering the slow progress in maritime power among the nations most diligent to attain it, would probably have failed of success, was prevented by the advice of a philosophical traveller, conveyed in such a lively turn of wit as easily changed the resolution of the king. Bias of Priene in Ionia, some say Pittacus of Mitylene in the isle of Lesbos, while he travelled after the Grecian custom, from curiosity and a love of knowledge, was presented to Crœsus at the Lydian court; and being asked by that prince what news from Greece; he answered with a republican freedom, that the islanders had collected powerful squadrons of cavalry with an intention of invading Lydia. "May the gods grant (said Crœsus), that the Greeks, who are unacquainted with horsemanship, should attack the disciplined valour of the Lydian cavalry; there would soon be an end to the contest." "In the same manner (replied Bias), as if the Lydians, who are totally unexperienced in naval affairs, should invade the Grecians by sea." Struck by the acuteness of this unexpected observation, Crœsus desisted from his intended expedition against the islands, and instead of employing new means for extending his conquests, determined peaceably to enjoy the laurels which he had won, and to display the grandeur which he had attained. But his happiness was soon after allayed by the death of his favourite son Atys, who was unfortunately killed at the chase of a wild boar. For this loss he continued disconsolate for two years and in a state of inaction, till the conquests of Cyrus, and growing power of the Persians, roused up his martial spirit, and diverted his mind to other thoughts. He apprehended that the success which attended Cyrus in all his undertakings, might at last prove dangerous to himself, and therefore resolved to put a stop, if possible, to his progress. In taking this resolution, which might probably be attended with the most important consequences, he was desirous to learn the will of heaven concerning the issue of the war. The principal oracles which he consulted were those of Branchis in Ionia, of Hammon in Libya, and of Delphi in Greece. Among these respected shrines, the oracle of Delphi maintained its ascendant, as the most faithful interpreter of fate. Crœsus was fully persuaded of its veracity; and desirous generously to compensate for the trouble which he had already given, and still meant to give, the priests of Apollo, he sacrificed 3000 oxen to the god, and adorned his shrine with dedications equally valuable for the workmanship and for the materials; precious vessels of silver, ewers of iron beautifully inlaid and enamelled; various ornaments of pure gold, particularly a golden lion weighing ten talents, and a female figure three cubits or near five feet high. In return for these magnificent presents, the oracle, in ambiguous language, flattered Crœsus with obtaining an easy victory over his enemies, and with enjoying a long life and a prosperous reign. The god at the same time enjoined him to contract an alliance with the most powerful of the Grecian states.

Elevated with these favourable predictions of Apollo, Crœsus prepared to yield a ready obedience to the only condition required on his part for the accomplishment of his aspiring purpose. Not deeming himself sufficiently acquainted with the affairs of Greece, to know what particular

Lydia.

particular republic was meant by the oracle, he made particular inquiry of those best informed concerning the state of Europe; and discovered, that among all the members of the Grecian confederacy, the Athenians and Lacedæmonians were justly entitled to the pre-eminence. In order to learn which of these communities deserved the epithet of *most powerful*, it was necessary to send ambassadors into Greece. The Lydians despatched with this important commission, soon discovered that the Athenians after having been long harassed by internal dissensions, were actually governed by the tyrant Pisistratus. The Spartans, on the other hand, though anciently the worst regulated of all the Grecian communities, had enjoyed domestic peace and foreign prosperity ever since they had adopted the wise institutions of Lycurgus. After that memorable period, they had repeatedly conquered the warlike Argives, triumphed over the hardy Arcadians; and notwithstanding the heroic exploits of Aristomenes, subdued and enslaved their unfortunate rivals of Messene. To the Lydian ambassadors, therefore, the Spartan republic appeared to be pointed out by the oracle, as the community whose alliance they were enjoined to solicit. Having repaired accordingly to Sparta, they were introduced not only to the kings and senate, but, as the importance of the negociation required, to the general assembly of the Lacedæmonians, to whom they, in few words, declared the object of their commission; "We are sent, O Lacedæmonians! by Crœsus, king of the Lydians and of many other nations, who being commanded by the oracle of Apollo to seek the friendship of the most powerful people of Greece, now summons you, who justly merit that epithet, to become his faithful allies, in obedience to the will of the god whose authority you acknowledge." The Lacedæmonians, pleased with the alliance of a warlike king, and still more with the fame of their valour, readily accepted the proposal. To the strict connexion of an offensive and defensive league, they joined the more respected ties of sacred hospitality. A few years before this transaction, they had sent to purchase gold at Sardis for making a statue of Apollo. Crœsus had on that occasion gratuitously supplied their want. Remembering this generosity, they gave the Lydian ambassadors at their departure, as a present for their master, a vessel of brass containing 300 amphoras (above 12 hogsheads), and beautifully carved on the outside with various forms of animals.

Crœsus, having thus happily accomplished the design recommended by the oracle, was eager to set out upon his intended expedition. He had formerly entered into alliance with Amasis king of Egypt, and Labynetus king of Babylon. He had now obtained the friendship of the most warlike nation of Europe. The newly raised power of Cyrus and the Persians seemed incapable of resisting such a formidable confederacy.

Elevated with these flattering ideas of his own invincible greatness, Crœsus waited not to attack the Persian dominions until he had collected the strength of his allies. The sanguine impetuosity of his temper, unexperienced in adversity, unfortunately precipitated him into measures no less ruinous than daring. Attended only by the arms of Lydia, and a numerous band of mercenaries, whom his immense wealth enabled him at any time to call into his service, he marched towards the river Halys; and having crossed with much difficulty that deep and broad stream, entered the province of Cappadocia, which formed the western frontier of the Median dominions. That unfortunate country soon experienced all the calamities of invasion. The Pterian plain, the most beautiful and the most fertile district of Cappadocia, was laid waste; the ports of the Euxine, as well as several inland cities, were plundered; and the inoffensive inhabitants were either put to the sword or dragged into captivity. Encouraged by the unresisting softness of the natives of those parts, Crœsus was eager to push forwards; and if Cyrus did not previously meet him in the field, he had determined to proceed in triumph to the mountains of Persia. Against this dangerous resolution he was in vain exhorted by a Lydian named Sandanis; who, when asked his opinion of the war, declared it with that freedom which the princes of the east have in every age permitted, amidst all the pride and caprices of despotic power, to men distinguished by the gifts of nature or education. "You are preparing, O king, to march against a people who lead a laborious and a miserable life; whose daily subsistence is often denied them, and is always scanty and precarious; who drink only water, and who are clothed with the skins of wild beasts. What can the Lydians gain by the conquest of Persia; they who enjoy all the advantages of which the Persians are destitute? For my part, I deem it a blessing of the gods, that they have not excited the warlike poverty of these miserable barbarians to invade and plunder the luxurious wealth of Lydia." The moderation of this advice was rejected by the fatal presumption of Crœsus; who confounding the dictates of experienced wisdom with the mean suggestions of pusillanimity, dismissed the counsellor with contempt.

Meanwhile, the approach of Cyrus, who was not of a temper to permit his dominions to be ravaged with impunity, afforded the Lydian king an opportunity of bringing the war to a more speedy issue than by his intended expedition into Persia. The army of Cyrus gradually augmented on his march: the tributary princes cheerfully contributing with their united strength towards the assistance of a master whose valour and generosity they admired, and who now took arms to protect the safety of his subjects, as well as to support the grandeur of his throne. Such was the rapidity of his movement, especially after being informed of the destructive ravages of the enemy in Cappadocia, that he arrived from the shores of the Caspian to those of the Euxine sea before the army of Crœsus had provided the necessaries for their journey. That prince, when apprised of the neighbourhood of the Persians, encamped on the Pterian plain; Cyrus likewise encamped at no great distance; frequent skirmishes happened between the light troops; and at length a general engagement was fought with equal fury and perseverance, and only terminated by the darkness of night. The loss on both sides hindered a renewal of the battle. The numbers, as well as the courage of the Persians, much exceeded the expectation of Crœsus. As they discovered not any intention to harass his retreat, he determined to move back towards Sardis, to spend the winter in the amusements of his palace;

Lydia. lace; and after summoning his numerous allies to his standard, to take the field early in the spring with such increase of force as seemed sufficient to overpower the Persians.

But this design was defeated by the careful vigilance of Cyrus. That experienced leader allowed the enemy to retire without molestation; carefully informing himself of every step which they took, and of every measure which they seemed determined to pursue. Patiently watching the opportunity of a just revenge, he waited until Crœsus had re-entered his capital, and had disbanded the foreign mercenaries, who composed the most numerous division of his army. It then seemed the proper time for Cyrus to put his Persians in motion; and such was his celerity, that he brought the first news of his own arrival in the plain of Sardis. Crœsus, whose firmness might well have been shaken by the imminence of this unforeseen danger, was not wanting on the present occasion to the duties which he owed to his fame and the lustre of the Lydian throne. Though his mercenaries were disbanded, his own subjects, who served him from attachment, who had been long accustomed to victory, and who were animated with a high sense of national honour, burned with a desire of enjoying an opportunity to check the daring insolence of the invaders. Crœsus indulged and encouraged this generous ardour. The Lydians in that age fought on horseback, armed with long spears; the strength of the Persians consisted in infantry. They were so little accustomed to the use of horses, that camels were almost the only animals which they employed as beasts of burden. This circumstance suggested to a Mede, by name Harpagus, a stratagem, which being communicated to Cyrus, was immediately adopted with approbation by that prince. Harpagus, having observed that horses had a strong aversion to the shape and smell of camels, advised the Persian army to be drawn up in the following order: All the camels which had been employed to carry baggage and provisions were collected into one body, arranged in a long line fronting the Lydian cavalry. The foot soldiers of the Persians were posted immediately behind the line, and placed at a due distance. The Median horse (for a few squadrons of these followed the standard of Cyrus) formed the rear of the army. As the troops on both sides approached to join battle, the Lydian cavalry, terrified at the unusual appearance of the camels, mounted with men in arms, were thrown into disorder, and turning their heads, endeavoured to escape from the field. Crœsus, who perceived the confusion, was ready to despair of his fortune; but the Lydians, abandoning their horses, prepared with uncommon bravery to attack the enemy on foot. Their courage deserved a better fate; but unaccustomed as they were to this mode of fighting, they were received and repelled by the experienced valour of the Persian infantry, and obliged to take refuge within the fortified strength of Sardis, where they imagined themselves secure. The walls of that city bid defiance to the rude art of attack, as then practised by the most warlike nations. If the Persian army should invest it, the Lydians were provided with provisions for several years; and there was reason to expect, that in a few months, and even weeks, they would receive such assistance from Egypt, Babylonia, and Greece (to which countries they had already sent ambassadors), as would oblige the Persians to raise the siege. Lydia ‖ Lydius.

The Lydian ministers despatched into Greece met with great sympathy from the Spartans. That people were particularly observant of the faith of treaties; and while they punished their enemies with unexampled severity, they behaved with generous compassion towards those whom they had once accepted for allies. They immediately resolved therefore to send him a speedy and effectual relief; and for this purpose assembled their troops, made ready their vessels, and prepared every thing necessary for the expedition.

The valour of the Spartans might perhaps have upheld the sinking empire of Lydia; but before their armament could set sail, Crœsus was no longer a sovereign. Notwithstanding the strength of Sardis, that city had been taken by storm on the 20th day of the siege; the walls having been scaled in a quarter, which appearing altogether inaccessible, was too carelessly guarded. This was effected by the enterprise of Hyreades a Mede, who accidentally observed a centinel descend part of the rock in order to recover his helmet. Hyreades was a native of the mountainous province of Mardia, and being accustomed to clamber over the dangerous precipices of his native country, resolved to try his activity in passing the rock upon which he had discovered the Lydian. The design was more easily accomplished than he had reason to expect; emulation and success encouraged the bravest of the Persians to follow his example; these were supported by greater numbers of their countrymen; the garrison of Sardis was surprised; the citadel stormed; the rich capital of Lower Asia subjected to the vengeful rapacity of an indignant victor. Thus ended the ancient kingdom of Lydia, which continued subject to the Persians till they also were conquered by the Macedonians. For the fate of the Lydian monarch, see the article Croesus.

LYDIAT, Thomas, a learned English divine, born in 1572, and educated at Oxford. About the year 1609, he became acquainted with Dr James Usher, afterwards archbishop of Armagh, who carried him to Ireland. He was at Dublin college for about two years, after which he returned to England; and the rectory of Alkrington becoming vacant, he was presented to it: but at length, being engaged for the debts of a near relation, which for the present he was unable to pay, having before spent his patrimony in printing several books, he was sent to prison; and was confined at Oxford, in the King's Bench, and elsewhere, till Sir William Boswell, a generous patron of learned men, Dr Robert Pink, warden of New college, Bishop Usher, and Dr Laud, discharged the debt. In the civil wars, he suffered much in his rectory of Alkrington from the parliament party; was four times pillaged to the value of at least 70l.; and was forced for a quarter of a year together to borrow a shirt to shift himself. He died in 1646. He wrote some pieces in English, and many works in Latin, on chronology and natural history.

LYDIUS lapis, in the natural history of the ancients; the name of the stone used by way of touchstone for the trial of gold and silver, and called by some *Heraclius lapis;* both of which names were also applied by the ancients to the loadstone; and hence has arisen

Lydius ‖ Lyme-regis

no small misunderstanding of their works. Pliny has observed, that both the loadstone and touchstone were at times called *Lydius* and *Heraclius lapis*.

The true *lapis Lydius*, or the touchstone, was anciently found only in the river Tmolus; but was afterwards found in many other places, and is now very common in many of the German rivers. The ancients give us very remarkable and circumstantial accounts of the uses they made of it; and it is plain they were able to discern the alloys of gold by means of it with very great exactness. We at present use several different stones under this name, and for the same purpose. In Italy, a green marble called *verdello*, is most frequently used; and with us, very frequently small pieces of *basalt*.

LYGEUM, a genus of plants belonging to the triandria class; and in the natural method ranking under the fourth order, *Gramina*. See BOTANY *Index*.

LYGII, LIGII, *Lugii*, or *Logiones*, in *Ancient Geography*, a people of Germany, to the west of the Vistula, where it forms a bend like a crescent; *Ligii*, (Dio); *Lugii*, (Strabo); *Logiones*, (Zosimus). Their name *Lugii* is conjectured to be derived from their mutually close confederacy or league. The Vistula was their boundary to the north, east, and south, with Mount Asciburgius to the west. Now the whole of that country lies in Poland, on this side the Vistula.

LYING-IN WOMEN. See MIDWIFERY.

LYING-to, or *Lying-by*, the situation of a ship, when she is retarded in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immoveable, with respect to her progressive motion, or headway. A ship is usually brought to by the main and fore top sails, one of which is laid aback, whilst the other is full; so that the latter pushes the ship forward, whilst the former resists this impulse, by forcing her astern. This is particularly practised in a general engagement, when hostile fleets are drawn up in two lines of battle opposite each other. It is also used to wait for some other ship, either approaching or expected; or to avoid pursuing a dangerous course, especially in dark or foggy weather.

LYME-REGIS, a sea port town of Dorsetshire in England, 148 miles from London. It lies near the sea, on the very borders of Devonshire, in a cavity between two rocky hills, which makes it difficult of access. As it lies on the declivity of a hill, the houses make a good show, rising one above another; and some of them are built of free-stone, and covered with blue slate. The number of inhabitants in 1811 was estimated at 1925. The corporation consists of a mayor (who is justice of peace during his mayoralty and the year after, and in the third year both justice and coroner), a recorder, 15 capital burgesses, and a town clerk. This place had formerly a very flourishing trade to France, Spain, the Straits, Newfoundland, and the West Indies; during which, the customs amounted some years to 16,000l. But it stands on such a high steep rock, that the merchants are obliged to load and unload their goods at a place a quarter of a mile off, called the *Cobb*, originally built in the reign of Edward III. which costs a great sum to maintain, but forms such a harbour as perhaps is not to be equalled in the world, the ships being sheltered by a high thick stone wall, raised in the main sea a good way from the shore, broad enough for carriages and warehouses, and the customhouse officers have one upon it. The cellars of the low part of the town, near the sea, are however often overflowed by the spring tides 10 or 12 feet. There are guns planted for the defence both of the Cobb and of the town, the shore here being very proper for batteries. The customhouse stands on pillars, with the corn market under it. There is an alms-house in Church-street, also Presbyterian and Anabaptist meeting-houses. The town hall is near Broad-street. The church stands at the east end of the town on a rising ground. The market here is on Friday, and there are two fairs in the year. We read, that in 774, the Saxon king Kinwulf gave land hereabouts to the church of Sherborn, for the boiling of salt there to supply its necessities. At this place the duke of Monmouth landed in 1685. A few years ago above 2000l. worth of gold and silver coin of Char. I. and II. were discovered by some labourers.

Lime reg ‖ Lyncuriu

LYMINGTON, a borough town of Hampshire in England, 97 miles south-west of London. It stands about a mile from the channel running between the main land and the isle of Wight; and has a harbour for vessels of considerable burden. The tide flows near a mile above the town. It has a market on Saturdays; and sends two members to parliament. The population in 1811 was estimated at 2641.

LYMPH, a fine colourless fluid, separated in the body from the mass of blood, and contained in peculiar vessels called *lymphatics*. See ANATOMY.

LYMPHÆA, were artificial caves or grottos amongst the Romans, furnished with a great many tubes, canals, and various hydraulic apparatus through which the water gushed out upon the spectators unexpectedly whilst they were admiring the beautiful arrangement of the shell-work in the grotto.

LYMPHATI, was a name given by the Romans to such as were seized with madness. It is supposed to be used for *Nymphati*, because the ancients imagined that every person who had the misfortune to see a Nymph was instantly struck with phrenzy. *Lymphati* may indeed signify "madmen," as derived from *lympha*, "water," over which element the Nymphs were thought to preside: But it appears most likely, that distracted people were called *lymphati*, from the circumstance of madmen's being affected with the *hydrophobia* or dread of water after the bite of a mad dog; for this peculiarity, in cases of canine madness, was unknown to the Romans.

LYNCEUS, in fabulous history, one of the 50 sons of Ægeus, married Hypermnestra, one of the 50 daughters of Danaus. See HYPERMNESTRA.

LYNCEUS, in fabulous history, one of the Argonauts, who went with Jason in the expedition to obtain the golden fleece. He was of great use to the Argonauts, by enabling them to avoid the sand banks and rocks they found in their way. The poets say, that Lynceus had so piercing a sight, that it could not only penetrate to the bottom of the sea, but even to hell. Some mythologists suppose, that this fable is taken from Lynceus's skill in observing the stars, and discovering the mines of gold and silver concealed in the earth.

LYNCURIUM, a stone thought to be the same with

Lyncurium, Lyncurius lapis.

with the tourmalin. The name is derived from λυγξ, "lynx," and ερον, "urine."

LYNCURIUS LAPIS, a stone capable of producing mushrooms.

In the Ephemerides of the Curious, we find mention made of a stone, so called by Dr John George Wolekamerus, who saw one in Italy, which never ceases to produce in a few days mushrooms of an excellent flavour by the most simple and easy process imaginable. "It is (says he) of the bigness of an ox's head, rough and uneven on its surface, and on which also are perceived some clefts and crevices. It is black in some parts, and in others of a lighter and grayish colour. Internally it is porous, and nearly of the nature of the pumice-stone, but much heavier; and it contains a small piece of flint, which is so incorporated with it as to appear to have been formed at the same time the stone itself received its form. This gives room to judge, that those stones have been produced by a fat and viscid juice, which has the property of indurating whatever matter it filtrates into. The stone here spoken of, when it has been lightly covered with earth, and sprinkled with warm water, produces mushrooms of an exquisite flavour, which are usually round, sometimes oval, and whose borders, by their inflexions and different curvities, represent in some measure human ears. The principal colour of these mushrooms is sometimes yellowish, and sometimes of a bright purple; but they are always disseminated with different spots, of a deep orange colour, or red brown; and when these spots are recent, and still in full bloom, they produce a very agreeable effect to the sight. But what appears admirable is, that the part of the stalk which remains adhering to the stone, when the mushroom has been separated from it, grows gradually hard, and petrifies in time, so that it seems that this fungites restores to the stone the nutritive juice it received from it, and that it thus contributes to its increase." John Baptist Porta pretends, that this stone is found in several parts of Italy; and that it is not only to be met with at Naples, taken out of Mount Vesuvius, but also on Mount Pantherico, in the principality of Arellino; on Mount Garganus, in Apulia; and on the summits of some other very high mountains. He adds, that the mushrooms which grow on those sorts of stones, and are usually called *fungi lyncurii*, have the property of dissolving and breaking the stone of the kidneys and bladder; and that, for this purpose, nothing more is required than to dry them in the shade, and being reduced to powder, to make the patient, fasting, take a sufficient quantity of this powder in a glass of white wine, which will so cleanse the excretory ducts of the urine, that no stones will ever after be collected in them. As to the form of those mushrooms, their root is stony, uneven, divided according to its longitudinal direction, and composed of fibres as fine as hairs, interwoven one with another. Their form, on first shooting out, resembles a small bladder, scarce then larger than the bud of a vine; and if in this state they are squeezed between the fingers, an aqueous subacid liquor issues out. When they are at their full growth, their pedicle is of a finger's length, larger at top than at bottom, and becomes insensibly slenderer in proportion as it is nearer the earth. These mushrooms are also formed in an umbella, and variegated with an infinity of little specks situated very near one another. They are smooth and even on the upper part, but underneath leafy like the common mushrooms. Their taste is likewise very agreeable, and the sick are not debarred eating of them when they have been dressed in a proper manner. Curiosity having prompted some naturalists and physicians to submit these stones to a chemical analysis, in order to be more competent judges of the uses they might be put to in medicine, there first came forth, by distillation, an insipid water, and afterwards a spirituous liquor. The retort having been heated to a certain point, there arose an oil, which had nearly the smell and taste of that of guaiacum; and a very acrid salt was extracted from the ashes.

Lyncurius lapis. Lynn regis

LYNN-REGIS, a town of Norfolk, in England, distant 98 miles from London. It is a handsome, large, well-built place, and sends two members to parliament. It was a borough by prescription in 1298. King John, on account of its adherence to him against the barons, made it a free borough, with large privileges. He appointed it a provost, and gave it a large silver cup of 73 ounces doubly gilt and enamelled, and a large silver sword that is carried before the mayor; though this last, according to some, is Henry VIII's sword, which he gave to the town when it came into his hands by exchange with the bishop of Norwich; after which it was called King's Lynn, whereas before it was Bishop's Lynn. Henry III. made it a mayor town, for its serving him against the barons. It has had 15 royal charters; and is governed by a mayor, high-steward, under-steward, recorder, 12 aldermen, and 18 common-council men. It has two churches, besides St Nicholas, a chapel of ease to St Margaret's, a Presbyterian and a Quakers meeting-house, with a bridewell or workhouse, and several alms-houses, and a free school. In September 1741 the spires of its two churches were both blown down by a storm of wind; and that of St Margaret's, which was 193 feet in height, having beat in the body of the church, it has been since rebuilt, towards which King George II. gave 1000l. and the late earl of Orford, then Sir Robert Walpole, 500l. This church was formerly an abbey, and afterwards one of the largest parish-churches in England. The town house, called Trinity-hall, is a noble old fabric; and so is the Exchange, which is of free-stone, with two orders of columns. St Nicholas's chapel is very ancient, and reckoned one of the fairest and largest of the kind in England. It has a bell tower of free stone, and an octagonal spire over it, both which together are 170 feet from the ground. There is a library in it that was erected by subscription; and there is another at St Margaret's. Here have been formerly several monasteries; but the only fabric remaining that belongs to any religious order is the Gray-friars steeple, a noted sea-mark. The situation of this town, near the fall of the Ouse into the sea, after having received several other rivers, of which some are navigable, gives it an opportunity of extending its trade into eight different counties: by which many considerable cities and towns, viz. Peterborough, Ely, Stamford, Bedford, St Ives, Huntingdon, St Neot's, Northampton, Cambridge, St Edmundsbury, and the north parts of Bucks, as well as the inland parts of Norfolk and Suffolk, are supplied with heavy goods, not only from our own

Lynn-regis. produce, as coals and salt from Newcastle, but also of merchandise imported from abroad, especially wine; of which two articles, viz. coals and wine, this is the greatest port for importation of any place on all the eastern coast of England; and those wherein the Lynn merchants deal more largely than any town in England, except Loudon, Bristol, and Newcastle. In return for this, Lynn receives back all the corn which the counties just mentioned produce, for exportation; and therefore sends more of it abroad than any port except Hull. The foreign trade of the merchants here, is very considerable, especially to Holland, Norway, and the Baltic, and also to Spain and Portugal; and formerly they drove a good trade to France, till it was turned off, by treaties on one hand, and by prohibitions, high duties, &c. on the other, to Spain and Portugal. The harbour is safe when ships are in it, but difficult to enter by reason of the many flats and shoals in the passage; which, however, are well buoyed, and good pilots are always ready. The town consists of about 2400 houses; and appears to have been very strong, by the ruins of the works demolished in the civil wars. St Ann's platform at the north end mounts 12 great guns, and commands all the ships passing near the harbour: and towards the land, besides the wall, there is a ditch. Four rivulets run through the town; and the tide of the Ouse, which is about as broad here as the Thames at London bridge, rises 20 feet perpendicular. In the great market-place a statue was erected in 1686 to the honour of King James II. There is another spacious market-place, adorned with a statue of King William III. and a fine cross with a dome and gallery round it, supported by 16 pillars. The market-house is of free-stone, supported by 16 columns, and is 70 feet high, erected on four steps, neatly adorned with statues, &c. Every first Monday in the month, the mayor, aldermen, preachers, &c. meet to hear and determine all controversies amicably, for preventing law-suits. This was first established in 1588, and is called *The Feast of Reconciliation*. The markets are on Tuesdays and Saturdays; and it has two fairs; one of which, beginning Feb. 14. lasts for a fortnight, and is called Lynn mart; the other is a cheese fair on Oct. 6. The adherence of this town to King John and to Henry VIII. as above mentioned, are not the only instances of its loyalty to its sovereigns; for, in the late civil wars, it held out for King Charles I. and sustained a formal siege of above 18,000 men of the parliament army for above three weeks; but, for want of relief, was obliged to surrender, and submit to the terms of paying 10s. a-head for every inhabitant, and a month's pay to the soldiers, to save the town from plunder. There are more gentry, and consequently more gaiety, in this town than in Yarmouth or even Norwich; there being such plenty of eatables and drinkables, that Spelman says, Ceres and Bacchus seem to have established their magazines at this place; the east side abounding with corn, sheep, rabbits, hares, &c. the west side with cheese, butter, black cattle, swans, and the wild-fowl common to marshes, besides the abundance of sea and river fish; so that he thinks there is no place in Great Britain, if in Europe, has such a variety in so small a compass of ground. At a small distance from the town, stands a mount, called the Lady's or Red Mount, which was once a chapel dedicated to the Virgin Mary, which was a resting-place for pilgrims on their way towards her convent at Walsingham. The king's staith-yard, or quay, where the greatest part of the imported wines is landed and put into large vaults, is a handsome square. People pass hence into the fen country, and over the famous washes into Lincolnshire in boats, which are often lost, by venturing out at an improper season and without guides. The population in 1811 was 10,259. Lynn-reg || Lyonet

LYNX. See Felis, Mammalia *Index*.

LYON *King of Arms*. See King; and Law, N° clviii. 16.

This office is of great antiquity and respect in Scotland; and although the precise time of its institution is unknown, yet it must have been as early as the introduction of armorial figures as hereditary marks of gentility and distinction into this country, which was in the 12th century. His regalia are, a crown of gold, with a crimson velvet cap, a gold tassel, and an ermine lining: a velvet robe reaching to his feet, with the arms of the kingdom embroidered thereon before and behind in the proper tinctures; a triple row of gold chain round his neck, with an oval gold medal pendant thereto, on one side of which is the royal bearing, and on the other St Andrew with his cross enamelled in proper colours, and a baton of gold enamelled green, powdered with the badges of the kingdom. The lord lyon's rank is superior to that of any other king of arms, as he holds his office immediately from the sovereign by commission under the great seal; whereas the kings of arms in England are deputies to the earl marshal, and act under his authority. Formerly Scotland was divided into two provinces, the one on the north and the other on the south side of Forth; and these provinces were under the management of two deputies appointed by the lord lyon, to superintend the execution of all the business of his office. Before the Revolution, the lord lyon, at his admission into office, was most solemnly crowned by the sovereign or his commissioner, in presence of the nobility, the officers of state, and other great men, after a suitable sermon preached in the royal chapel; and his crown was of the same form with the imperial crown of the kingdom. On solemn occasions he wears the regalia above described; at all other times he wears the oval gold medal or badge on his breast, suspended by a broad green ribbon. He has the absolute disposal of all the offices in his own court, and of the heralds and pursuivants places. The messengers at arms throughout Scotland are also created by him, and are amenable to his jurisdiction. And the powers vested in him by his commission are the same with those of the sovereign in all matters relative to the marks of gentility.

LYONET, Peter, an ingenious naturalist, and member of several learned societies, was born at Maestricht, and was descended from a very ancient and respectable family of Lorrain. He had scarcely attained his seventh year before he displayed an uncommon strength and agility in all bodily exercises; but he was not less diligent in the improvement of his mind. Being placed at the Latin school, he learned chronology, and exercised himself in Latin, Greek, and French poetry, as also in Hebrew, logic, and the Cartesian physics. He was particularly fond of the study of languages,

Lyonet. guages, whereof he understood no less than nine, living and dead. Having entered the university of Leyden, he studied the Newtonian philosophy, geometry, algebra, &c.; but his father (who was a clergyman), desiring he should attach himself to divinity, he reluctantly abandoned the former studies, as his passion for them was not easily to be overcome. He at the same time applied himself to anatomy, and also to music and drawing. He began afterwards to practise sculpture: and performed several pieces in wood, some of which are preserved, and have been greatly admired by the artists. After this, he betook himself to drawing portraits of his friends from life; wherein, after three or four months practice, he became a great proficient. Having attained the degree of candidate in divinity, he resolved to study law, to which he applied himself with so much zeal, that he was promoted at the end of the first year. Arrived at the Hague, he undertook the study of decyphering; and became secretary of the cyphers, translator of the Latin and French languages, and patent-master to their High Mightinesses. Meanwhile, having taken a strong liking to the study of insects, he undertook an historical description of such as are found about the Hague, and to that end collected materials for several volumes; and having invented a method of drawing adapted thereto, he enriched this work with a great number of plates, universally admired by all the connoisseurs who had seen them. In the year 1724 was printed at the Hague a French translation of a German work, the 'Theology of Insects,' by Mr Lesser. Love of truth engaged by Mr Lyonet to defer the publication of this above-mentioned description, and to make some observations on that work, to which he has added two most beautiful plates, engraved from his designs. This performance caused his merit to be universally known and admired. The celebrated M. de Reaumur had the above translation reprinted at Paris, not so much on account of the work itself, as of Mr Lyonet's observations; and bestowed on it, as did also many other authors, the highest encomiums. He afterwards executed drawings of the fresh water polypus for Mr Trembley's beautiful work, 1744. The ingenious Wandelaar had engraved the first five plates; when Mr Lyonet, who had never witnessed this operation, concerned at the difficulties he experienced in getting the remaining eight finished in the superior style he required, resolved to perform the task himself. He accordingly took a lesson of one hour of Mr Wandelaar, engraved three or four small plates, and immediately began upon the work himself, which he performed in such a manner as drew on him the highest degree of praise, both from Mr Trembley and from many other artists, particularly the celebrated Van Gool; who declared that the performance astonished not only the amateurs, but also the most experienced artists. In 1748 he was chosen member of the Royal Society of London. In 1749 he began (by mere chance) his amazing collection of horns and shells, which, according to the universal testimony of all travellers and amateurs who have visited it, is at present the most beautiful, and certainly one of the most valuable in Europe. In 1753 he became member of the newly-established Dutch Society of Sciences at Haerlem; and in 1757, after the celebrated M. le Cat, professor in anatomy and surgery, and member of almost all the principal societies in Europe, had seen Mr Lyonet's incomparable *Traité Anatomique de la Chenille qui ronge le Bois de Saule*, with the drawings belonging to it (which work was afterwards published), he was elected member of the Royal Academy of Sciences of Rome, whereof M. le Cat was perpetual secretary. After the publication of this treatise he became, in 1760, member of the Royal Academy of Sciences of Berlin; in 1761, of the Imperial Academy of Naturalists; and, in 1762, of the Imperial Academy of Sciences at St Petersburgh. In order to enable such as might be desirous of following him in his intricate and most astonishing discoveries respecting the structure of this animal, Mr Lyonet published, in the Transactions of the Dutch Society of Sciences at Haerlem, a description and a plate (as he also afterwards did in French at the beginning of his *Traité Anatomique*) of the instrument and tools he had invented for the purpose of dissection, and likewise of the method he used to ascertain the degree of strength of his magnifying glasses. Notwithstanding all this labour, which was considerably increased by the extensive correspondence which he for many years carried on with several learned and respectable personages, he still found means to set apart a large proportion of his time (as he himself mentions it in his preface) for the immediate service of his country; but was not fortunate enough (as appears by his writings) to get any other recompense for his exertions than sorrow and disappointment.—During the last fifteen or twenty years of his life, Mr Lyonet added to the valuable treasure he had already collected of natural curiosities, a most superb cabinet of paintings, consisting of more than 560 performances; among which are many of the most eminent works of the first Dutch masters. He did this with a view to procure himself some amusement during the latter part of his life, when old age and infirmities must weaken his powers, and set bounds to his activity. He had always indeed accustomed himself to employment, insomuch that he has written some pieces of Dutch poetry; and this disposition remained with him till within a fortnight of his death, when he was attacked with an inflammation in his breast, which, though apparently cured, was, in the end, the cause of his dissolution. He died at the Hague in January 1789, aged 83 years, leaving behind him a most estimable character.

Lyonet ii Lyons.

LYONOIS, a large province of France; bounded on the north by Burgundy; on the east, by Dauphiny, Bresse, and the principality of Dombs; on the south, by Vivarais and Velay; and on the west by Auvergne and a small part of Bourbonnois. It comprehends Lower Lyonois, Beaujolois, and Forez; and it produces corn, wine, fruits, and more especially excellent chesnuts. The principal rivers are the Seine, the Rhone, and the Loire. Lyons is the capital town.

LYONS, a large, rich, ancient, and famous town of France, being the most considerable in the kingdom, next to Paris, with an archbishop's see, an academy of sciences and belles letters, and an academy of arts and sciences settled here in 1736. It is seated at the confluence of the rivers Rhone and Saone: on the side of

Lyons || Lyre.

of it are two high mountains; and the mountain of St Sebastian serves as a bulwark against the north winds, which often blow here with great violence. It contains nearly 100,000 inhabitants; and the houses, in general, are high and well built. It has six gates, and as many suburbs. The town-house, the arsenal, the amphitheatre built by the ancient Romans, the hospital, and the numerous palaces, are worthy of a traveller's attention. The cathedral is a superb structure, and the canons that compose the chapter are all persons of distinction. It was a place of great trade, and was especially distinguished by its silk manufactures, which however have been greatly reduced by the Revolution. It derives vast advantages from the rivers near it; and is situated in E. Long. 4. 59. N. Lat. 45. 46. Lyons was the scene of some of the horrid transactions of the French revolution. See FRANCE.

LYRA, a species of fish. See CALLYONIMUS, ICHTHYOLOGY *Index*.

LYRA, in *Astronomy*, a constellation in the northern hemisphere. The number of its stars, in Ptolemy's catalogue, is ten; in Tycho's eleven; in Hevelius's seventeen; and in the Britannic catalogue twenty one.

LYRE, a musical instrument of the stringed kind, much used by the ancients.

Concerning the number of strings with which this instrument was furnished, there is great controversy. Some assert it to be only three; and that the sounds of the two remote were acute, and that of the intermediate one a mean between those two extremes; that Mercury, the inventor, resembled those three chords to as many seasons of the year, which were all that the Greeks reckoned, namely, summer, winter, and spring: assigning the acute to the first, the grave to the second, and the mean to the third.

Others assert that the lyre had four strings; that the interval between the first and the fourth was an octave; that the second was a fourth from the first, and the fourth the same distance from the third, and that from the second to the third was a tone.

Another class of writers contend that the lyre of Mercury had seven strings. Nicomachus, a follower of Pythagoras, and the chief of them, gives the following account of the matter: "The lyre made of the shell was invented by Mercury; and the knowledge of it, as it was constructed by him of seven strings, was transmitted to Orpheus: Orpheus taught the use of it to Thamyris and Linus; the latter of whom taught it to Hercules, who communicated it to Amphion the Theban, who built the seven gates of Thebes to the seven strings of the lyre." The same author proceeds to relate, "That Orpheus was afterwards killed by the Thracian women; and that they are reported to have cast his lyre into the sea, which was afterwards thrown up at Antissa, a city of Lesbos: that certain fishers finding it, they brought it to Terpander, who carried it into Egypt, exquisitely improved, and showing it to the Egyptian priests, assumed to himself the honour of its invention."

This difference among authors seems to have arisen from their confounding together the Egyptian and the Grecian Mercuries.—The invention of the primitive lyre with three strings was due to the first Egyptian HERMES, as mentioned under that article.—The lyre attributed to the Grecian Mercury is described by almost all the poets to be an instrument of seven strings*. Vincenzio Galilei has collected the various opinions of the several Greek writers who have mentioned the invention of the chelys or testudo; and the late Mr Spence has done the same in a very circumstantial but ludicrous manner. "Horace talks of Mercury as a wonderful musician, and represents him with a lyre. There is a ridiculous old legend relating to this invention, which informs us, that Mercury, after stealing some bulls from Apollo, retired to a secret grotto, which he used to frequent, at the foot of a mountain in Arcadia. Just as he was going in, he found a tortoise feeding at the entrance of his cave: he killed the poor creature, and perhaps ate the flesh of it. As he was diverting himself with the shell, he was mightily pleased with the noise it gave from its concave figure. He had possibly been cunning enough to find out, that a thong pulled strait and fastened at each end, when struck with the finger, made a sort of musical sound. However that was, he went immediately to work, and cut several thongs out of the hides he had lately stolen, and fastened them as tight as he could to the shell of this tortoise; and, in playing with them, made a new kind of music with them to divert himself in his retreat." This, considered only as an account of the first invention of the lyre, is not altogether so unnatural.

Lyre.

* See *Mercury*.

The most ancient representations of this instrument agree very well with the account of its invention: the lyre, in particular on the old celestial globes, was represented as made of one entire shell of a tortoise; and that of Amphion in the celebrated group of the Diree or Toro, in the Farnese palace at Rome, which is of Greek sculpture, and very high antiquity, is figured in the same manner.

There have, however, been many other claimants to the seven-stringed lyre. For though Mercury invented this instrument in the manner already related, it is said he afterwards gave it to Apollo, who was the first that played upon it with method, and made it the constant companion of poetry. According to Homer's account of this transaction, in his hymn to Mercury, it was given by that god to Apollo, as a peace-offering and indemnification for the oxen which he had stolen from him:

> To Phœbus Maia's son presents the lyre,
> A gift intended to appease his ire,
> The god receives it gladly, and essays
> The novel instrument a thousand ways;
> With dext'rous skill the plectrum wields; and sings
> With voice accordant to the trembling strings,
> Such strains as gods and men approv'd, from whence
> The sweet alliance sprung of sound and sense.

Diodorus informs us, that Apollo soon repenting of the cruelty with which he had treated Marsyas in consequence of their musical contest, broke the strings of the lyre, and by that means put a stop for a time to any further progress in the practice of that new instrument. "The Muses (adds he) afterwards added to this instrument the string called *mese*; Linus, that of *lichanos*; and

Lyre. and Orpheus and Thamyris, those strings which are named *hypate* and *parhypate* (A).

Again, Many ancient and respectable authors tell us, that, before the time of Terpander, the Grecian lyre had only four strings; and, if we may believe Suidas, it remained in this state 856 years, from the time of Amphion, till Terpander added to it three new strings, which extended the musical scale to a heptachord, or seventh, and supplied the player with two conjoint tetrachords. It was about 150 years after this period, that Pythagoras is said to have added an eighth string to the lyre, in order to complete the octave, which consisted of two disjoint tetrachords.

Boetius gives a different history of the scale, and tells us, that the system did not long remain in such narrow limits as a tetrachord. Chorœbus, the son of Athis, or Atys, king of Lydia, added a fifth string; Hyagnis, a sixth; Terpander, a seventh; and at length Lychaon of Samos, an eighth. But all these accounts are irreconcileable with Homer's hymn to Mercury, where the chelys, or testudo, the invention of which he ascribes to that god, is said to have had seven strings. There are many claimants among the musicians of ancient Greece to the strings that were afterwards added to these, by which the scale, in the time of Aristoxenus, was extended to two octaves. Athenæus, more than once, speaks of the nine-stringed instrument; and Ion of Chios, a tragic and lyric poet and philosopher, who first recited his pieces in the 82d Olympiad, 452 B. C. mentions, in some verses quoted by Euclid, the ten-stringed lyre; a proof that the third conjoint tetrachord was added to the scale in his time, which was about 50 years after Pythagoras is supposed to have construeted the octachord.

The different claimants among the Greeks to the same musical discoveries, only prove that music was cultivated in different countries, and that the inhabitants of each country invented and improved their own instruments, some of which happening to resemble those of other parts of Greece, rendered it difficult for historians to avoid attributing the same invention to different persons. Thus the single flute was given to Minerva and to Marsyas; the syrinx or fistula, to Pan and to Cybele; and the lyre or cithara, to Mercury, Apollo, Amphion, Linus, and Orpheus. Indeed, the mere addition of a string or two to an instrument without a neck, was so obvious and easy, that it is scarce possible not to conceive many people to have done it at the same time. Lyre.

With respect to the form of the ancient lyre, as little agreement is to be found among authors as about the number of strings. The best evidences concerning it, are the representations of that instrument in the hands of ancient statues, bas-reliefs, &c. See Plate CCXCVIII. where, Plate CCXCVIII.

Fig. 1. is a representation of the testudo, or lyre of Amphion, in front, as it appears on the base of the celebrated Toro Farnese at Rome. This admirable work, consisting of four figures bigger than the life, besides the toro or bull, was found in Caracalla's baths, where the Farnese Hercules was likewise discovered: and, except the Laocoon, is the only piece of Greek sculpture mentioned by Pliny that is now remaining. The two projections near the bottom, seem to have been fastenings for the strings, and to have answered the purpose of tail-pieces in modern instruments. Fig. 1.

Fig. 2. The lyre held by Terpsichore, in the picture of that muse dug out of Herculaneum. Fig. 2.

Fig. 3. The Abyssinian testudo, or lyre in use at present in the province of Tigre, from a drawing of Mr Bruce, communicated to Dr Burney. "This instrument (says he) has sometimes five, sometimes six, but most frequently seven strings, made of the thongs of raw sheep or goat skins, cut extremely fine, and twisted; they rot soon, are very subject to break in dry weather, and have scarce any sound in wet. From the idea, however, of this instrument being to accompany and sustain a voice, one would think that it was better mounted formerly. "The Abyssinians have a tradition, that the sistrum, lyre, and tambourine, were brought from Egypt into Ethiopia, by Thot, in the very first ages of the world. The flute, kettle-drum, and trumpet, they say, were brought from Palestine, with Menelek, the son of their queen of Saba by Solomon, who was their first Jewish king. Fig. 3.

"The lyre in Amharic is called *beg*, 'the sheep;' in Ethiopia it is called *mesinko;* the verb *sinko* signifies to strike strings with the fingers: no plectrum is ever used in Abyssinia; so that mesinko, being literally interpreted, will signify the 'stringed instrument played upon with the fingers.'

"The sides which constitute the frame of the lyre, were anciently composed of the horns of an animal of the goat kind, called *agazen*, about the size of a small cow, and

(A) It has been already related, that the lyre invented by the Egyptian Mercury had but three strings; and, by putting these two circumstances together, Dr Burney observes, we may perhaps acquire some knowledge of the progress of music, or at least, of the extension of its scale, in the highest antiquity.

Mese, in the Greek music, is the fourth sound of the second tetrachord of the great system, and first tetrachord invented by the ancients, answering to our A, on the fifth line in the base. If this sound then was added to the former three, it proves two important points; first, that the most ancient tetrachord was that from E in the base to A; and that the three original strings in the Mercurian and Apollonian lyre were tuned E, F, G, which the Greeks called *Hypate Meson, Parhypate Meson, Meson Diatonos.* The addition therefore of *Mese* to these, completed the first and most ancient tetrachord, E, F, G, A.

The string *lichanos*, then, being added to these, and answering to our D on the third line in the base, extended the compass downwards, and gave the ancient lyre a regular series of five sounds in the Dorian mode, the most ancient of all the Greek modes; and the two strings called *Hypate* and *Parhypate*, corresponding with our B and C in the base, completed the heptachord, or seven sounds, B, C, D, E, F, G, A, a compass that received no addition till after the time of Pindar, who calls the instrument then in use the *seven-tongued lyre.*

Lyre. and common in the province of Tigre. I have seen several of these instruments very elegantly made of such horns, which nature seems to have shaped on purpose. Some of the horns of an African species of this animal may be seen in M. Buffon's history of the king of France's cabinet. They are bent, and less regular than the Abyssinian; but after fire-arms became common in the province of Tigre, and the woods were cut down, this animal being more scarce, the lyre has been made of a light red wood; however, it is always cut into a spiral twisted form, in imitation of the ancient materials of which the lyre was composed. The drawing I send you was one of these instruments made of wood.

"The kingdom of Tigre, which is the largest and most populous province of Abyssinia, and was during many ages the seat of the court, was the first which received letters, and civil religious government; it extended once to the Red sea: various reasons and revolutions have obliged the inhabitants to resign their sea coast to different barbarous nations, Pagan and Mahometan: while they were possessed of it, they say that the Red sea furnished them with tortoise-shells, of which they made the bellies of their lyres, as the Egyptians did formerly, according to Apollodorus and Lucian; but having now lost that resource, they have adopted in its place a particular species of gourd, or pumpkin, very hard and thin in the bark, still imitating with the knife the squares, compartments, and figure of the shell of the tortoise.

"The lyre is generally from three feet to three feet six inches high; that is, from a line drawn through the point of the horns, to the lower part of the base of the sounding board. It is exceedingly light, and easy of carriage, as an instrument should naturally be in so rugged and mountainous a country.

"When we consider the parts which compose this lyre, we cannot deny it the earliest antiquity. Man in his first state was a hunter and a fisher, and the oldest instrument was that which partakes most of that state. The lyre, composed of two principal pieces, owes the one to horns of an animal, the other to the shell of a fish.

"It is probable, that the lyre continued with the Ethiopians in this rude state as long as they confined themselves to their rainy, steep, and rugged mountains; and afterwards, when many of them descended along the Nile into Egypt, its portability would recommend it in the extreme heats and weariness of their way. Upon their arrival in Egypt, they took up their habitation in caves, in the sides of mountains, which are inhabited to this day. Even in these circumstances, an instrument larger than the lyre must have been inconvenient and liable to accidents in those caverns; but when these people increased in numbers and courage, they ventured down into the plain, and built Thebes. Being now at their ease, and in a fine climate, all nature smiling around them, music and other arts were cultivated and refined, and the imperfect lyre was extended into an instrument of double its compass and volume. The size of the harp could be now no longer an objection; the Nile carried the inhabitants everywhere easily, and without effort; and we may naturally suppose in the fine evenings of that country, that the Nile was the favourite scene upon which this instrument was practised; at least the sphinx and lotus upon its head, seem to hint that it was someway connected with the overflowings of that river." See HARP.

Lyre || Lyrodi.

Fig. 4. An Etruscan lyre, with seven strings, in the collection of Etruscan, Greek and Roman antiquities, published from the cabinet of the Hon. Sir William Hamilton, Vol. I. Naples 1766. Plate CIX. With respect to this instrument, it is worthy of observation, that though the vase upon which it is represented is of such indisputable and remote antiquity, the tail-piece, bridge, belly and sound-holes, have a very modern appearance, and manifest a knowledge in the construction of musical instruments among the Etruscans superior to that of the Greeks and Romans in much latter times. The lower part of the instrument has much the appearance of an old bass-viol, and it is not difficult to discover in it more than the embryo of the whole violin family. The strings lie round, as if intended to be played on with a bow; and even the cross lines on the tail-piece are such as we frequently see on the tail-pieces of old viols. Fig. 4.

Fig. 5. The Tripodian lyre of Pythagoras the Zacynthian, from a bass relief in the Maffei palace at Rome representing the whole choir of the muses. Athenæus gives the following account of this extraordinary instrument, Lib. XIV. cap. xv. p. 637. Many ancient instruments are recorded (says Artemon), of which we have so little knowledge, that we can hardly be certain of their existence; such as the tripod of Pythagoras the Zacynthian, which, on account of its difficulty, continued in use but a short time. It resembled in form the Delphic tripod, whence it had its name. The legs were equidistant, and fixed upon a moveable base that was turned by the foot of the player: the strings were placed between the legs of the stool; the vase at the top served for the purpose of a sound-board, and the strings of the three sides of the instrument were tuned to three different modes, the Doric, Lydian, and Phrygian. The performer sat on a chair made on purpose: striking the strings with the fingers of the left hand, and using the plectrum with the right, at the same time turning the instrument with his foot to whichever of the three modes he pleased: so that by great practice he was enabled to change the modes with such velocity, that those who did not see him would imagine they heard three different performers playing in three different modes. After the death of this admirable musician, no other instrument of the same kind was ever constructed." Fig. 5.

Fig. 6. A lyre in the famous ancient picture dug out of Herculaneum, upon which Chiron is teaching young Achilles to play. See CHIRON. Fig. 6.

LYRIC POETRY, was such as the ancients sung to the lyre or harp.—It was originally employed in celebrating the praises of gods and heroes, and its characteristic was sweetness. Who was the author of it is not known. It was much cultivated by the Greeks: and Horace was the first who attempted it in the Latin language. Anacreon, Alcæus, Stesichorus, Sappho, and Horace, were the most celebrated lyric poets of antiquity.

LYRODI, among the ancients, a kind of musicians who played on the lyre, and sung at the same time.

Lytodi || Lysippus.

This appellation was also given to such as made it their employment to sing lyric poems composed by others.

LYS, or Lis. See Lis.

Lys, the name of a measure used by the Chinese in estimating distances. Two hundred lys make 60 geographical miles, which are equal to one degree.

LYSANDER, a famous Spartan general. See Sparta.

LYSANDRIA, a Samian festival, celebrated with games and sacrifices in honour of the Lacedæmonian general Lysander. It was anciently called *herea*: but this name the Samians abolished by a public decree.

LYSIARCH, an ancient magistrate, who superintended the sacred games, and presided in matters of religion in the province of Lycia. He was created in a council consisting of deputies from all the provincial cities, in number 23. The lysiarchs were both heads of the council and pontiffs of the province.

LYSIAS, an ancient Grecian orator, was born at Syracuse in the 80th Olympiad. At 15, he went to Thurion, a colony of the Athenians; and when grown up, assisted in the administration of the government there many years. When about 47 years of age, he returned to Athens; whence, being afterwards banished by the 30 tyrants, he went to Megara. Upon his return, Thrasybulus would have had him employed again in state matters; but this not taking place, he spent the remainder of his life as a private man. He was very familiar with Socrates, and other illustrious philosophers. He professed to teach the art of speaking; not that he pleaded at the bar himself, but he supplied others with speeches. "Fuit Lysias in causis forensibus non versatus (says Cicero), sed egregie subtilis scriptor atque elegans, &c. Quintilian calls him, "subtilis atque elegans, et quo nihil, si oratorio satis sit docere, quæras perfectius. Nihil enim est inane, nihil arcessitum; puro tamen fonti, quam magno flumini, proprior." Plutarch and Photius relate, that 425 orations were formerly exhibited under the name of Lysias; of which 34 only are now extant. The best edition of them is by Dr John Taylor at London, 1739, 4to; Cambridge, 1740, 8vo.

LYSIMACHIA, Loosestrife, a genus of plants belonging to the pentandria class; and in the natural method ranking under the 20th order, *Rotaceæ*. See Botany *Index*.

LYSIPPUS, a celebrated Greek statuary, was born at Sicyone, and first followed the business of a locksmith, which he quitted in order to practice painting: But he afterwards applied himself entirely to sculpture; in which he acquired an immortal reputation, and made a great number of statues that were the admiration of the people of Athens and Rome. His grand statue of the Sun represented in a car drawn by four horses, was worshipped at Rhodes. He made several statues of Alexander and his favourites, which were brought to Rome by Metellus after he had reduced the Macedonian empire; and the statue of a man wiping and anointing himself after bathing, being particularly excellent, was placed by Agrippa before his baths in that city. He lived in the time of Alexander the Great, about 334 B. C.; and left three sons, who were all famous statuaries.

Lysippus || Lyttelton

LYTHRUM, Purple Loosestrife, a genus of plants belonging to the decandria class; and in the natural method ranking under the 17th order, *Calycanthemæ*. See Botany *Index*.

LYTTELTON, Edward, Lord Lyttelton, keeper of the great seal in the reign of Charles I. was eminent for his probity and his moderation at the commencement of that monarch's disputes with his subjects. Without forfeiting his fidelity to the king, he preserved the esteem of the parliament till 1644, when he was made colonel of a regiment in the king's army at York. He died in 1645. Besides several of his speeches which have been printed, he wrote reports in the common pleas and exchequer, printed at London in 1683, in folio; several arguments and discourses, &c.

Lyttelton, *George Lord*, eldest son of Sir Thomas Lyttleton, Bart. descended from the great judge Lyttelton, was born in 1700, at seven months; and the midwife, supposing him to be dead, threw him carelessly into the cradle; where, had not some signs of life been taken notice of by one of the attendants, he might never have recovered. He received the elements of his education at Eaton school, where he showed an early inclination to poetry. His pastorals and some other light pieces were originally written in that seminary of learning; from whence he was removed to the university of Oxford, where he pursued his classical studies with uncommon avidity, and sketched the plan of his Persian Letters; a work which afterwards procured him great reputation, not only from the elegance of the language in which they were composed, but from the excellent observations they contained on the manners of mankind.

In the year 1728, he set out on the tour of Europe; and, on his arrival at Paris, accidentally became acquainted with the honourable Mr Poyntz, then our minister at the court of Versailles; who was so struck with the extraordinary capacity of our young traveller, that he invited him to his house, and employed him in many political negociations, which he executed with great judgment and fidelity.

Mr Lyttelton's conduct, while on his travels, was a lesson of instruction to the rest of his countrymen. Instead of lounging away his hours at the coffee-houses frequented by the English, and adopting the fashionable follies and vices of France and Italy, his time was passed alternately in his library and in the society of men of rank and literature. In this early part of his life, he wrote a poetical epistle to Dr Ayscough, and another to Mr Pope, which show singular taste and correctness.

After continuing a considerable time at Paris with Mr Poyntz, who, to use his own words, behaved like a second father to him, he proceeded to Lyons and Geneva; and from thence to Turin, where he was honoured with great marks of friendship by his Sardinian majesty. He then visited Milan, Venice, Genoa, and Rome, where he applied himself closely to the study of the fine arts; and was, even in that celebrated metropolis, allowed a perfect judge of painting, sculpture, and architecture.

During his continuance abroad, he constantly cor-

Lyttelton. responded with Sir Thomas, his father. Several of his letters are yet remaining, and place his filial affection in a very distinguished light. He soon after returned to his native country, and was elected representative for the borough of Okehampton in Devonshire; and behaved so much to the satisfaction of his constituents, that they several times re-elected him for the same place without putting him to the least expence.

About this period, he received great marks of friendship from Frederic prince of Wales, father of his present majesty; and was, in the year 1737, appointed principal secretary to his royal highness, and continued in the strictest intimacy with him till the time of his death. His attention to public business did not, however, prevent him from exercising his poetical talent. A most amiable young lady, Miss Forteseue, inspired him with a passion, which produced a number of little pieces, remarkable for their tenderness and elegance; and he had a happy facility of striking out an extempore compliment, which obtained him no small share of reputation. One evening being in company with Lord Cobham and several of the nobility at Stowe, his lordship mentioned his design of putting up a bust of Lady Suffolk in his beautiful gardens; and, turning to Mr Lyttelton, said, "George, you must furnish me with a motto for it." "I will, my lord," answered Mr Lyttleton; and directly produced the following couplet:

Her wit and beauty for a court were made,
But truth and goodness fit her for a shade.

When Mr Pitt, afterwards earl of Chatham, lost his commission in the guards, in consequence of his spirited conduct in parliament, Mr Lyttelton was in waiting at Leicester-house, and, on hearing the circumstance, immediately wrote these lines:

Long had thy virtue mark'd thee out for fame,
Far, far superior to a cornet's name;
This generous Walpole saw, and griev'd to find
So mean a post disgrace that noble mind;
The servile standard from thy free-born hand
He took, and bade thee lead the patriot band.

In the year 1742, he married Lucy, the daughter of Hugh Forteseue, Esq. of Filleigh in the county of Devon, the lady above mentioned, whose exemplary conduct, and uniform practice of religion and virtue, established his conjugal happiness upon the most solid basis.

In 1744, he was appointed one of the lords commissioners of the treasury; and, during his continuance in that station, constantly exerted his influence in rewarding merit and ability. He was the friend and patron of the late Henry Fielding, James Thomson author of the Seasons, Mr Mallet, Dr Young, Mr Hammond, Mr West, Mr Pope, and Voltaire. On the death of Thomson, who left his affairs in a very embarrassed condition, Mr Lyttelton took that poet's sister under his protection. He revised the tragedy of Coriolanus, which that writer had not put the last hand to; and brought it out at the theatre-royal, Covent-garden, with a prologue of his own writing, in which he so affectingly lamented the loss of that delightful bard, that not only Mr Quin, who spoke the lines, but almost the whole audience, spontaneously burst into tears. Lyttelton

In the beginning of the year 1746, his felicity was interrupted by the loss of his wife, who died in the 29th year of her age; leaving him one son, Thomas, the late Lord Lyttelton; and a daughter, Lucy, who afterwards married Lord Viscount Valentia. The remains of his amiable lady were deposited at Over-Arley in Worcestershire; and an elegant monument was erected to her memory in the church of Hagley, which contains the following inscription written by her husband:

Made to engage all hearts, and charm all eyes:
Tho' meek, magnanimous; tho' witty, wise;
Polite, as all her life in courts had been;
Yet good, as she the world had never seen:
The noble fire of an exalted mind,
With gentlest female tenderness combin'd.
Her speech was the melodious voice of love,
Her song the warbling of the vernal grove.
Her eloquence was sweeter than her song,
Soft as her heart, and as her reason strong.
Her form each beauty of her mind express'd,
Her mind was virtue by the Graces dress'd.

Besides these beautiful lines, Mr Lyttelton wrote a monody on the death of his lady, which will be remembered while conjugal affection and a taste for poetry exist in this country.

His masterly observations on the conversion and apostleship of St Paul, were written at the desire of Gilbert West, Esq. in consequence of Mr Lyttelton's asserting, that, beside all the proofs of the Christian religion, which might be drawn from the propheeies of the Old Testament, from the necessary connection it has with the whole system of the Jewish religion, from the miracles of Christ, and from the evidence given of his resurrection by all the other apostles, he thought the conversion of St Paul alone, duly considered, was of itself a demonstration sufficient to prove Christianity to be a divine revelation. Mr West was struck with the thought: and assured his friend, that so compendious a proof would be of great use to convince those unbelievers that will not attend to a longer series of arguments; and time has shown he was not out in his conjecture, as the tract is esteemed one of the best defences of Christianity which has hitherto been published.

In 1754, he resigned his office of lord of the treasury, and was made cofferer to his majesty's household, and sworn of the privy-council: previous to which, he married a second time, Elizabeth daughter of Field-marshal Sir Robert Rich; whose indiscreet conduct gave him great uneasiness, and from whom he was separated, by mutual consent, a few years after his marriage.

After being appointed chancellor, and under treasurer of the court of exchequer, he was, by letters-patent dated the 19th of November 1757, 31 Geo. II. created a peer of Great Britain, by the style and title of *Lord Lyttelton, baron of Frankley, in the county of Worcester*. His speeches on the Scotch and mutiny bills in the year 1747, on the Jew bill in 1753, and on the privilege of parliament in 1763, showed sound judgment, powerful eloquence, and inflexible integrity.

Lyttelton. grity. During the last ten years he lived chiefly in retirement, in the continual exercise of all the virtues which can ennoble private life. His last work was Dialogues of the Dead, in which the morality of Cambray and the spirit of Fontenelle are happily united.

He was suddenly seized with an inflammation of the bowels, in the middle of July 1773, at his seat at Hagley; which terminated in his death, on the 22d of that month, His last moments were attended with unimpaired understanding, unaffected greatness of mind, calm resignation, and humble but confident hopes in the mercy of God. As he had lived universally esteemed, he died lamented by all parties. A complete collection of his works has been published since his decease, by his nephew George Ayscough, Esq. Lyttelton.

M.

M || Mabillon.

M, A liquid consonant, and the twelfth letter in the alphabet.

It has one unvaried sound, and is pronounced by striking the upper lip against the lower; in which the pronunciation of this letter agrees with that of *b*; the only difference between the two consisting in a little motion made in the nose in pronouncing *m*, and not in *b*: whence it happens that those who have taken cold, for *m* ordinarily pronounce *b*; the nose in that case being disabled from making the necessary motion.

All consonants are formed with the aid of vowels; in *em* the vowel precedes, in *be* it follows; and *m* is never mute.

Quintilian observes, that the *m* sometimes ends Latin words but never Greek ones; the Greeks always changing it in that case into *n*, for the sake of the better sound.

M is also a numeral letter, and among the ancients was used for a thousand; according to the verse,

M *caput est numeri, quem scimus mille teneri.*

When a dash is added to the top of it, as $\overline{M}$; it signifies a thousand times a thousand.

M, as an abbreviature, stands for Manlius, Marcus, Martius, and Mucius: M. A. signifies *magister artium*, or master of arts; MS. manuscript, and MSS. manuscripts.

M, in astronomical tables, and other things of that kind, is used for *meridional* or southern; and sometimes for *meridian* or mid-day.

M, in medicinal prescription, is frequently used to signify a maniple or handful; and it is sometimes also put at the end of a recipe, for *misce*, "mingle;" or for *mixtura*, "a mixture," Thus *m. f. julapium*, signifies "mix and make a julep."

M, in *Law*, the brand or stigma of a person convicted of manslaughter, and admitted to the benefit of his clergy. It is to be burnt on the brawn of his left thumb.

MAAT, John. See Blankof.

MABILLON, John, a very learned writer of France in the 17th century, was born at Perremonte, on the frontiers of Champagne, in 1632. He was educated in the university of Rheims, and afterwards entered into the abbey of the Benedictines of St Remy. In the year 1663, he was appointed keeper of the treasures and monuments of France at St Dennis: but having unfortunately broke a looking glass there, which was pretended to have belonged to Virgil, he desired leave of his superiors to quit an employment which frequently obliged him to tell things he did not believe. Next year he went to Paris; and was very serviceable to Father d'Acheri, who was desirous of having some young monk who could assist him in compiling his *Spicilegium*. This made him known. Soon after, the congregation of St Maur having formed a design of publishing new editions of the fathers, revised from the MSS. in the libraries of the Benedictines, Mabillon was charged with the edition of St Bernard, which he prepared with extraordinary diligence. After that, he published many other works, which are evidences of his vast capacity and industry. In 1682, he was employed by Mr Colbert in examining some ancient titles relating to the royal family. The year following he sent him into Germany, to search the archives and libraries of the ancient abbeys, for what was most curious and proper to illustrate the history of the church in general, and that of France in particular. He has published an account of this journey. In 1685, he undertook another journey into Italy, by order of the king of France; and returned the year following with a very noble collection. He placed in the king's library above 3000 volumes of rare books, printed and in MSS. and composed two volumes of the pieces which he had discovered in that country. He was highly esteemed for his virtues as well as his learning. Mabillon || Macarians.

MACACO, or Macauco. See Lemur, Mammalia *Index*.

MACAO, a town of China in the province of Canton, seated in an island at the mouth of the river Tae. The Portuguese have been in possession of the harbour for 150 years. Formerly they had a great trade here; but now they have only a fort with a small garrison. The houses are built after the European manner; and there is a Chinese mandarin, as well as a Portuguese governor, to take care of the town and the neighbouring country. E. Long. 109. N. Lat. 22. 12.

Macao. See Psittacus, Ornithology *Index*.

MACARIANS, in ecclesiastical history, the followers of Macarius, an Egyptian monk, who was distinguished

Macarians || Macassar.

stinguished towards the close of the fourth century for his sanctity and virtue. In his writings there are some superstitious tenets, and also certain opinions that seem tainted with Origenism. The name has been also applied to those who adopted the sentiments of Macarius a native of Ireland, who about the close of the ninth century, propagated in France the error afterwards maintained by Averrhoes, that one individual intelligence or soul performed the spiritual and rational functions in all the human race.

MACARONI. See FOLENGIO, and the next article.

MACARONIC, or MACARONIAN, a kind of burlesque poetry, consisting of a jumble of words of different languages, with words of the vulgar tongue Latinized, and Latin words modernized. *Macaroni* among the Italians, as has been observed by Cælius Rhodiginus, signifies *a coarse clownish man;* and because this kind of poetry is patched out of several languages, and full of extravagant words, &c. the Italians, among whom it had its rise, gave it the name of *macaronian* or *macaronic* poetry. Others choose to derive it *à macaronibus*, from *macaroons*, a kind of confection made of meal not boulted, sweet almonds, sugar, and the white of eggs, accounted a great dainty among the country people in Italy; which, from their being composed of various ingredients, occasioned this kind of poetry, which consists of Latin, Italian, Spanish, French, English, &c. to be called by their name.

Example.—A bold fellow in the *macaronic* style, says,

Enfilavi omnes scadrones et regimandos, &c.

Another example:

Archelos pistoliferos furiamque manantum,
Et grandem esmeutam quæ inopinum facta ruelle est:
Toxinumque alto troublantem corda clochero, &c.

Theoph. Folengius, a Benedictine monk of Mantua, was the first who invented, or at least cultivated, this kind of verse. See FOLENGIO.

The best pieces of this kind are, the *Baldus* of Folengio, and *Macaronis Forza* by Stefonio a Jesuit, among the Italians; and the *Reatus veritabilis, super terribili esmeuta paisanarum de Ruellis*, among the French. The famous Rabelais first transferred the *macaronic* style out of the Italian verse into French prose: and on the model thereof formed some of the best things in his *Pantagruel*. We have little in English in the *macaronian* way; nothing scarce, but some little loose pieces collected in Camden's remains. But the Germans and Netherlanders have had their *macaronic* poets; witness the *Certamen Catholicum cum Calvinistis*, of one Martinius Hameonius Frisius, which contains about 1200 verses, all the words whereof begin with the letter *C*.

MACARSKA, a town of Dalmatia, and capital of Primogria, with a pretty good harbour, and a bishop's see, seated on the gulf of Venice. E. Long. 17. 57. N. Lat. 43. 42.

MACASSAR, a considerable kingdom of the island of Celebes, in the East Indies. The climate is very hot; and would be intolerable, were it not for the rains which fall when the sun is directly over their heads. The soil is extremely fertile, and there are ripe fruits at all times of the year. There are great numbers of monkeys, who are devoured by monstrous serpents, some of which are so large, that they will swallow one of these animals entire. The Macassars are large, robust, courageous, and greatly addicted to war. They profess the Mahometan religion. Macassar || Maccabees

MACASSAR, a large, strong, and handsome town, of the island of Celebes, and capital of the kingdom of the same name, where the king resides. The houses are all built of wood, and supported by thick posts; and they have ladders to go up into them, which they draw up as soon as they have entered. The roofs are covered with very large leaves, which prevent the rain from entering. It is seated near the mouth of a large river, which runs through the kingdom from north to south. E. Long. 117. 55. S. Lat. 5. 0. See CELEBES, SUPPLEMENT.

MACASSAR Poison, in *Natural History*, called *ippo* in the Macassar and Malayan tongue, is the gum of a certain tree, shining, brittle, black, and every way like stone-pitch, growing in the island of Celebes, in the South seas; with which all the natives arm themselves in travel, having a long hollow trunk of a hard red wood like brasil, accurately bored, and at one end is fixed a large lance-blade of iron. Then they make a small arrow, very straight, and somewhat bigger than a large wheaten straw: at one end they fix it into a round piece of white, light, soft wood, like cork, about the length of the little finger, just fit for the bore of the trunk, to pass clear by the force of one's breath, and to fill it so exactly, that the air may not pass by, but against it, in order to carry it with the greater force. At the other end they fix in it either a small fish-tooth for that purpose, or make a blade of wood of the bigness of the point of a lancet, about three-quarters of an inch long, and making a little notch in the end of the arrow, they stick it firm therein, which they anoint with poison. The poisonous gum, when gathered, is put into hollow bamboos or canes, stopped up very close, and thus brought to Macassar. When they fit it for use, they take a piece of smooth turtle-shell, and a stick cut flat and smooth at the end: then they take green galangal root, grate it, and with the addition of a little fair water, press the juice into a clean china dish: then with a knife scraping a little of the poison upon the shell, dip the end of the stick in the forementioned liquor, and with this dissolve the poison to the consistence of a syrup: when this is done, they anoint the fish-tooth or wooden blade with the same stick, and lay it in the sun, so that it may be baked hard. The pointed arrows thus prepared, are put in hollow bamboos, close shut, and in this state they retain their virtue for a month.

MACCABÆUS, JUDAS. See JUDAS.

MACCABEES, two apocryphal books of scripture, containing the history of Judas and his brothers, and their wars against the Syrian kings in defence of their religion and liberties, so called from Judas Mattathias, surnamed *Maccabæus*, as some say from the word מכבי, formed of the initials of מי כמכה באלם יהוה, q. d. *Who is like unto thee, O Lord, among the gods;* which was the motto of his standard; whence those who fought under his standard were called *Maccabees*, and the name was generally applied to all who suffered in the cause of

Maccabees, Macbeth.

of the true religion, under the Egyptian or Syrian kings. The first book of the Maccabees is an excellent history, and comes nearest to the style and manner of the sacred historians of any extant. It was written originally in the Chaldee language, of the Jerusalem dialect, and was extant in this language in the time of Jerome. From the Chaldee it was translated into Greek, from the Greek into Latin. It is supposed to have been written by John Hyrcanus the son of Simon, who was prince and high priest of the Jews near 30 years, and began his government at the time where this history ends. It contains the history of 40 years, from the reign of Antiochus Epiphanes to the death of Simon the high priest: that is, from the year of the world 3829 to the year 3869; 131 years before Christ. The second book of the Maccabees begins with two epistles sent from the Jews of Jerusalem to the Jews of Egypt and Alexandria; to exhort them to observe the feast of the dedication of the new altar erected by Judas on his purifying the temple. The first was written in the 169th year of the era of the Seleucidæ, i. e. before Christ 144; and the second in the 188th year of the same era, or 125 before Christ; and both appear to be spurious. After these epistles follows the preface of the author to his history, which is an abridgement of a larger work, composed by one Jason, a Jew of Cyrene, who wrote in Greek the history of Judas Maccabeus and his brethren, and the wars against Antiochus Epiphanes, and Eupator his son. The second book does not by any means equal the accuracy and excellency of the first. It contains a history of about 15 years, from the execution of Heliodorus's commission, who was sent by Seleucus to fetch away the treasures of the temple, to the victory obtained by Judas Maccabees over Nicanor; that is, from the year of the world 3828, to the year 3843, 147 years before Christ.

There are in the Polyglot Bibles, both of Paris and London, Syriac versions of both these books: but they, as well as the English versions which we have among the apocryphal writers in our Bible, are derived from the Greek. There is also a third book of the Maccabees, containing the history of the persecution of Ptolemy Philopator against the Jews in Egypt, and their sufferings under it; which seems to have been written by some Alexandrian Jew in the Greek language, not long after the time of Siracides. It is in most of the ancient manuscript copies of the Greek Septuagint; particularly in the Alexandrian and Vatican, but was never inserted into the vulgar Latin version of the Bible, nor consequently into any of our English copies. Moreover, Josephus's history of the martyrs that suffered under Antiochus Epiphanes, is found in some manuscript Greek Bibles, under the name of the fourth book of the *Maccabees*.

MACBETH, a Scots nobleman in the 11th century, nearly allied to Duncan king of Scotland.—Not contented with curbing the king's authority, he carried his pestilent ambition so far as to put him to death; and, chasing Malcolm Canmore his son and heir into England, usurped the crown. Siward earl of Northumberland, whose daughter Duncan had married, undertook, by the order of Edward the Confessor, the protection of the fugitive prince.—He marched with an army into Scotland; defeated and killed Macbeth; and restored Malcolm to the throne of his ancestors. Shakespeare has made this transaction the subject of one of his best tragedies. Macbeth, Macbride.

MACBRIDE, Dr David, an eminent physician and philosopher, was descended from an ancient family in the county of Galloway in Scotland. His grandfather, a clergyman, had settled in Ireland about the end of the 17th century, as minister to a Presbyterian congregation at Belfast; and his father, who followed the same line, was settled at Ballymony in the county of Antrim, where he married, and where our author was born in April 1726. After a proper school-education, and having passed some time under the tuition of an eminent surgeon in his native place, he was sent to the university of Glasgow. Having there completed the usual course of academical studies, he went to Edinburgh for the further prosecution of medical science. After a short stay here, a war then prevailing between France and Britain, he was induced to go on board the navy in the station of a surgeon's mate. In the service of his country he continued for several years; and after discharging for some time the duties of an assistant, he was raised to the rank of surgeon. In this situation, he first turned his thoughts towards the discovery of a remedy for the sea-scurvy. It was not, however, at this period, that either chance or reasoning suggested to him the employment of an article which has since been attended with the most beneficial consequences. Here he had an opportunity only of observing the symptoms, of studying the nature, and of lamenting the consequences, of the disease.

The termination of the war by the peace of Aix-la-Chapelle put a period to Dr Macbride's employment as a naval surgeon. He had now probably obtained much medical knowledge in the school of experience; but he was sensible that he had still much to acquire in that of science. An ardent keenness to mingle in active life had led him from the schools of medicine at an earlier period than could have been wished; and an earnest desire to found his future practice in the best established principles led him back to them, when a judgment, matured by years, and informed from the observation of facts, rendered him capable of hearing teachers with greater advantage. He returned therefore to Edinburgh, and again entered on the career of academical pursuits, under the tuition of Dr Monro, and those other teachers, whose abilities raised the fame of that medical school. But not satisfied with the instructions to be had from any one set of professors, the celebrity of the medical teachers in London led him also to visit that capital. There he particularly became the pupil of those distinguished lecturers, Dr Hunter and Dr Smellie. And while from the former he laboured to acquire an accurate chirurgical knowledge, from the latter he endeavoured to obtain the true principles of midwifery considered as a science. At the same time he was no less industrious in improving himself in the successful practice of both arts by attention at hospitals.

Thus prepared for the exercise of his profession, about the end of the year 1749 he fixed his residence in Dublin in the character of surgeon and accoucheur. If amiable manners, and extensive knowledge of his profession, could alone have been sufficient introductions to practice, he might in a short time have look-

Macbride.

ed for a competent share of business in that capital; but while he had to combat that objection which very generally arises from youth, his progress was also not a little retarded by an uncommon degree of modesty. Hence for several years he remained almost in a state of obscurity, and was employed by but few people either of rank or fortune. But if it is to be regretted that for many years his time was not so fully employed in the lucrative part of his profession as was due to his merit, it ought still to be remembered, that this essentially promoted the cause of science: for by this means his genius and industry were directed to medical researches; and were productive of discoveries which will with honour transmit his name to latest posterity. These, though some of them might have been successfully turned to his own emolument, were freely communicated to the world in different publications; and he did not show greater ingenuity in making discoveries than liberality of sentiment in publishing them for the advantage of others. His first publication, entitled, "Experimental Essays on Medical and Philosophical Subjects," made its appearance in the year 1764.—These essays are five in number: 1. On the fermentation of alimentary mixture and the digestion of the food. 2. On the nature and properties of fixed air. 3. On the different kinds of antiseptics. 4 Of the dissolvent power of quicklime. 5. Of the sea scurvy. The merit of all these is sufficiently known and acknowledged: but the last of them is unquestionably the most important; the method therein proposed of both the prevention and cure of that dreadful disease, the scurvy, having been confirmed by repeated and undeniable observation.

Having thus equally distinguished himself as an ingenious philosopher and able practitioner, the world were not now slow in bestowing upon him the tribute of applause to which he was entitled. His name was enrolled with honour in the lists of many learned societies; and the university where his studies had first been commenced, were proud to confer upon him the degree of doctor of medicine.

The reputation, however, of being a distinguished author, was to him but a secondary object; and his talents were not confined to the advancement of medicine alone. Having successfully discovered a considerable improvement in the art of tanning, with that spirited generosity which is ever the concomitant of real worth, he speedily and freely communicated it to the public, by publishing, first, "An Account of a New Method of Tanning;" and afterwards, "Instructions for carrying on the New Method of Tanning." As a mark of approbation for this liberal conduct, as well as a testimony of respect for his ingenuity, prize-medals were conferred upon him by the Societies of Arts both in London and Dublin. But his last and most extensive publication was more immediately in the line of his own profession. It is entitled, "A Methodical Introduction to the Theory and Practice of Medicine." In that valuable work he has given a concise and connected view of the principles and practice of the healing art, as best established by sound reason, and confirmed by accurate observation. Most, if not all, of these publications, not only went through various editions, but were translated into different languages.

After the merit of Dr Macbride came to be properly known, the public seemed to show a desire for making compensation for having so long overlooked it. His employment increased so rapidly, that he had more business than he could transact either with ease or safety. This having kept him in perpetual agitation both of body and mind, at last induced an almost total incapacity of sleeping. From this circumstance his health could not fail to be impaired. In this situation, after accidental exposure to cold, he was attacked with a fever, which put an end to his life on the 13th of December 1778, in the 53d year of his age.

Macbride || Mace.

Those who were among his most intimate acquaintance were inclined to believe that his death was not a little hastened by domestic calamities. During his residence in Dublin he was twice married, and was as often subjected to that inexpressible distress which must result from a final separation in this world from the most intimate and loving friends. By both of his wives he had several children; but none of them survived their father. And on these calamitous events, although he was able to conceal his feelings from the world, yet they gave a severe shock to his constitution. After his death, several of the playful trinkets of his infants, with the signature of *dulces exuviæ*, were found in his repositories among papers on medical and other important subjects: an incontrovertible proof, that in him at least, the great mind of the philosopher was conjoined with the feeling heart of the affectionate father. But if his abilities were remarkable as a philosopher and physician, if his conduct was exemplary as a husband and parent, his manners were no less amiable as a companion and friend. His polite and benevolent conduct, joined to his taste for the fine arts, conciliated the affections and esteem of all who knew him. His death was universally and sincerely lamented in the city of Dublin.

MACCLESFIELD, a town of Cheshire in England, 171 miles from London, is seated on the edge of a forest of the same name, upon a high rank near the river Bollin; and is a large handsome town, with a fine church and a very high steeple. It was erected into a borough by King Edward III. is governed by a mayor, and enjoys great privileges and jurisdictions by virtue of the court and the liberties of the forest. In its church are two brass plates, on one of which there is a promise of 26,000 years and 26 days pardon for saying five Pater-Nosters, and five Aves. It has extensive manufactures in silk and cotton. In Macclesfield forest are many pits dug for the sake of the turf; in which it is common to find fir-trees buried, which are dug up for various uses, but chiefly for splinters that serve the poor for candles. The population in 1811 was 12,299. W. Long. 2. 10. N. Lat. 53. 15.

MACE, an ancient weapon, formerly much used by the cavalry of all nations. It was commonly made of iron; its figure much resembles a chocolate mill; many specimens may be seen in the Tower. It was was with one of these that Walworth mayor of London knocked the rebel Wat Tyler from off his horse in Smithfield for approaching the young King Richard II. in an insolent manner; and as he fell he dispatched him with his dagger. The mace in modern times changed its form; and being no longer a war instrument, is made of copper or silver gilt, ornamented with

Mace, Macedon.

a crown, globe, and cross, and is now the chief insignia of authority throughout Great Britain. Similar to the ancient maces, were those staves at the end of which iron or leaden balls armed with spikes were suspended by chains: they were formerly carried by the pioneers of the trained bands or militia of London.

MACE, in the *Materia Medica*, the second coat or covering of the kernel of the nutmeg, is a thin, membranaceous substance, of a yellowish colour; being met with in flakes of an inch or more in length, which are divided into a multitude of ramifications. It is of an extremely fragrant, aromatic, and agreeable flavour; and of a pleasant, but acrid oleaginous taste. See MATERIA MEDICA *Index*.

MACEDON, or MACEDONIA, a most celebrated kingdom of antiquity, was bounded on the east by the Ægean sea; on the south by Thessaly and Epirus; on the west by the Ionian sea or Adriatic; on the north, at first by the river Strymon and the Scardian mountains, but afterwards by the river Nessus or Nestus. In a direct line the whole country extended only 150 miles in length; but the windings of the coast lengthened it out to three times that extent; in which almost every convenient situation was occupied by a Grecian sea-port. The country was naturally divided, by the Thermaic and Strymonic gulfs, into the provinces of Pieria, Chalcis, and Pangæus. The middle region, which took its name from a city of Eubœa from whence it was originally peopled, was very fertile and pleasant; the inland country, being diversified by lakes, rivers, and arms of the sea, was extremely convenient for inland navigation, while the towns of Amphipolis, Potidæa, Acanthus, and many others, afforded marts for the commerce of the republics of Greece, as well as of Thrace and Macedon. On one side of this district were the mountains of Pangæus, and on the other the plains of Pieria. The Pangæan mountains, which extended 90 miles towards the east and the river Nessus, though proper neither for corn nor pasture, produced plenty of timber for ship-building; while the southern branches of the mountains contained rich veins of gold and silver; but these, though wrought successively by the Thasians and the Athenians, were only brought to perfection by Philip of Macedon, who extracted from them gold and silver to the value of 200,000*l.* sterling annually. Pieria extended 50 miles along the Thermaic gulf, to the confines of Thessaly and Mount Pindus. The inland part of the country was beautifully diversified with shady hills and fountains; and so admirably calculated for solitary walks and retirement, that the ancients looked upon it to be the favourite haunts of the Muses, and accordingly bestowed upon them the title of *Pierides*.

1 Situation, &c. of the country.

2 Different names.

In the most early times this country was called *Æmathia*, from *Æmathius* one of its princes. The name of *Macedon* is said to have been derived from *Macedo* a descendant of Deucalion; though others suppose it to have been only a corruption of *Mygdonia* a district of the country. In those remote ages of antiquity, Macedon, like most other countries of Europe, was divided into a great number of petty principalities, of which scarce even the names are known at this time. All authors agree, however, that *Caranus* was the first who established any permanent sovereignty in Macedon. He was an Argive, a descendant of Hercules, and about 800 years B. C. conducted a small colony of his countrymen into the inland district of Macedon, at that time distinguished by the name of *Æmathia* as already mentioned. This territory was about 300 miles in circumference. On the south it was separated from the sea by a number of Greek republics, of which the most considerable were those of Olynthus and Amphipolis; and on the north, east, and west, was surrounded by the barbarous kingdoms of Thrace, Pœonia, and Illyricum. According to the traditions of those times, Caranus, having consulted the oracle on the success of his intended expedition, was commanded to be directed by the goats in the establishment of his empire. For some time he proceeded at random, without knowing what to make of the oracle's answer; but happening to enter the small kingdom of *Æmathia*, at that time governed by King Midas, he observed a herd of goats running towards *Edessa* the capital. Recollecting then the answer of the oracle, he attacked and took the city by surprise, soon after making himself master of the whole kingdom. In memory of this remarkable event he called the city *Ægea*, and the people *Ægiates*, from the goats who conducted him, and made use of the figure of a goat in his standard. From this fable also we see why the figure of a goat is so frequently seen on the coins of Philip and his successors.

3 Kingdom founded by Caranus.

Macedon.

4 Policy of this prince.

The little colony of Argives led into Æmathia by Caranus would soon have been overwhelmed by the barbarous nations who surrounded it, had not this prince and his subjects taken care to ingratiate themselves with their neighbours, rather than to attempt to subdue them by force of arms. They instructed them in the Grecian religion and government, and in the knowledge of many useful arts; adopting themselves, in some degree, the language and manners of the barbarians; imparting to them in return some part of the Grecian civilization and polite behaviour. Thus they gradually associated with the fierce and warlike tribes in their neighbourhood; and this prudent conduct, being followed by succeeding generations, may be looked upon as one of the causes of the Macedonian greatness.

Caranus, dying after a reign of three years, left the kingdom to his son Cœnus; who having considerably enlarged his dominions, was succeeded by Thurymas, and he by Perdiccas I. This last prince is by Thucydides and Herodotus accounted the founder of the Macedonian monarchy; though this history is so obscured by fable, that nothing certain can now be known concerning it. In process of time, however, the good understanding which had subsisted between the Macedonians and their barbarous neighbours began to suffer an interruption; and in 691 B. C. the kingdom was for the first time invaded by the Illyrians. At first they did considerable damage by their ravages; but the Macedonian monarch, Argæus, having decoyed them into an ambush, cut off great numbers, and obliged the remainder to leave the kingdom. In the reign of his successors, however, they returned, and occasionally proved very troublesome enemies till the reigns of Philip and Alexander.

5 Perdiccas I. a celebrated monarch.

6 Invasion by the Illyrians.

7 Interference of the Persians and Macedonians.

In the mean time the kingdom of Macedon began to be affected by those great events which took place in other parts of the world. Cyrus having overthrown the

Macedon. the Babylonian empire, and conquered all the western part of Asia, established a mighty monarchy, which threatened all the eastern parts of Europe with subjugation. The Greeks, however, having now emerged from their barbarism, and acquired great knowledge in the art of war, were able to resist effectually this very formidable power; but the kingdom of Macedon, obscure and unconnected, was obliged to yield, and though not formally made a province of the Persian empire, was nevertheless accounted in some sort as under the vassalage and protection of the Persians. Alcetas, who ascended the Macedonian throne about the time that the Persian monarchy was founded, had the dexterity to preserve his dominions from the encroachments of the Greeks on the one hand, and of the Persians on the other; but in the reign of his successor Amyntas, a formal demand was made of submission to the great king Darius, by sending him a present of earth and water. Seven ambassadors were sent on this errand by Megabizus, one of the officers of Darius. They were sumptuously entertained by Amyntas; but having attempted to take some indecent liberties with the Macedonian women, Alexander the king's son caused them all to be murdered. This rash action had almost proved the ruin of the kingdom; but Alexander found means to pacify Bubaris the general sent against him by Megabizus, by showing him his sister Gygæa, a very beautiful woman, with whom the Persian fell in love at first sight, and afterwards married her.

8 Advantages accruing to Macedon from this interference.

From this time the Macedonians were accounted the faithful allies of the Persians; and, through the interest of his son-in-law, Amyntas obtained the country in the neighbourhood of Mount Hæmus and Olympus, at the same time that the city of Alabanda in Phrygia was given to Amyntas the nephew of Alexander. The Macedonians distinguished themselves in the time of the Persian invasion of Greece, by furnishing their allies with 200,000 recruits; though some cities, particularly Potidæa, Olynthus, and Pallene, adhered to the Grecian interest. The two last were taken and rased, and the inhabitants massacred by the Persians; but Potidæa escaped by reason of the sea breaking into the Persian camp, where it did great damage. Alexander, however, afterwards thought proper to court the favour of the Greeks by giving them intelligence of the time when Mardonius designed to attack them. The remaining transactions of this reign are entirely unknown, farther than that he enlarged his dominions to the river Nessus on the east and the Axius on the west.

9 Reign of Perdiccas II.

Alexander I. was succeeded by his son Perdiccas II. who, according to Dr Gillies, "inherited his father's abilities, though not his integrity." But from his duplicity above mentioned both to Greeks and Persians, it does not appear that he had much to boast of as to the latter quality. In the Peloponnesian war he espoused the cause of the Spartans against the Athenians, from whom he was in danger by reason of their numerous settlements on the Macedonian coast, and their great power by sea. For some time, however, he amused the Athenians with a show of friendship; but at last, under pretence of enabling Olynthus and some other cities to recover their liberties, he assisted in destroying the influence of the Athenians in those places, in hopes of establishing that of the Macedo- Macedon. nians in its stead. But this design failed of success; the Olynthian confederacy was broken, and the members of it became subject to Sparta, until at last, by the misfortunes of that republic, they became sufficiently powerful not to resist the encroachments of the Macedonians, but to make considerable conquests in their country.

10 Of Archelaus I.

Perdiccas II. was succeeded about 416 B. C. by Archelaus I. He enlarged his dominions by the conquest of Pydna, and other places in Pieria, though his ambition seems rather to have been to improve his dominions than greatly to extend them. He facilitated the communication between the principal towns of Macedon, by cutting straight roads through most part of the country; he built walls and fortresses in such places as afforded a favourable situation; encouraged agriculture and the arts, particularly those subservient to war; formed magazines of arms; raised and disciplined a considerable body of cavalry; and in a word, says Dr Gillies, "added more to the solid grandeur of Macedon than had been done by all his predecessors put together. Nor was he regardless of the arts of peace. His palace was adorned by the works of Grecian painters. Euripides was long entertained at his court; Socrates was earnestly solicited to live there, after the example of this philosophic poet, formed by his precepts and cherished by his friendship: men of merit and genius in the various walks of literature and science were invited to reside in Macedon, and treated with distinguished regard by a monarch duly attentive to promote his own glory and the happiness of his subjects."

11 The kingdom becomes a prey to civil dissensions.

This great monarch died after a reign of six years, a space by far too short to accomplish the magnificent projects he had formed. After his death the kingdom fell under the power of usurpers or weak and wicked monarchs. A number of competitors constantly appeared for the throne; and these by turns called in to their assistance the Thracians, Illyrians, Thessalians, the Olynthian confederacy, Athens, Sparta, and Thebes. Bardyllis, an active and daring chief, who, from being head of a gang of robbers, had become sovereign of the Illyrians, entered Macedon at the head of a numerous army, deposed Amyntas II. the father of Philip, and set up in his place one Argæus, who consented to become tributary to the Illyrians. Another candidate for the throne, named *Pausanias*, was supported by the Thracians; but by the assistance of the Thessalians and Olynthians, Amyntas was enabled to resume the government. After his restoration, however, the Olynthians refused to deliver up several places of importance belonging to Macedon which Amyntas had either intrusted to their care, or which they had taken from his antagonist. Amyntas complained to Sparta; and that republic, which had already formed schemes of very extensive ambition, so readily complied with the request, that it was generally supposed to have proceeded from Spartan emissaries sent into Macedonia. They pretended indeed to hesitate a little, and to take time to deliberate on the army which ought to be raised for the purpose; but Cleigenes, the principal ambassador, represented the urgency of the case in such a manner, that the troops which happened at that time to be ready were ordered to take the field without delay. Two thousand Spartans, under the

12 War with the Olynthians.

command

Macedon. command of Eudamidas, were ordered into Macedon, while a powerful reinforcement under the command of Phœbidas, brother to the general, was ordered to follow him as soon as possible. By accident, Phœbidas and his auxiliaries were detained till the season for action was passed; but Eudamidas with his small army performed very essential service. The appearance of a Spartan army at once encouraged the subjects and allies of the Olynthians to revolt; and the city of Potidæa, a place of great importance in the isthmus of Pallene, surrendered soon after his arrival in the country. Being too much elated with his success, however, Eudamidas approached so near the city of Olynthus, that he was unexpectedly attacked, defeated, and killed, in a sally of the citizens. He was succeeded by Teleutias the brother of Agesilaus, who had under his command a body of 10,000 men, and was farther assisted by Amyntas king of Macedon, and Derdas his brother, the governor or sovereign of the most westerly province of Macedon, which abounded in cavalry. By these formidable enemies the Olynthians were defeated in a number of battles, obliged to shut themselves up in their city, and prevented from cultivating their territory; on which Teleutias advanced with his whole forces to invest the city itself. His excessive eagerness to destroy his enemies proved his ruin. A body of Olynthian horse had the boldness to pass the river Amnias in sight of the allied army, though so much superior in number. Teleutias ordered his targeteers to attack them, the Olynthians, having retreated across the river, were closely pursued by the Lacedæmonians, great part of whom also passed the river; but the Olynthians suddenly turned upon them, killed upwards of 100, with Tlemonidas their leader. Teleutias, exasperated at this disaster, ordered the remainder of the targeteers and cavalry to pursue; while he himself advanced at the head of the heavy-armed foot with such celerity that they began to fall into disorder. The Olynthians allowed them to proceed, and the Lacedæmonians very imprudently advanced just under the towers and battlements of the city. The townsmen then mounted the walls, and discharged upon them a shower of darts, arrows, and other missile weapons, while the flower of the Olynthian troops, who had been purposely posted behind the gates, sallied forth and attacked them with great violence. Teleutias, attempting to rally his men, was slain in the first onset; the Spartans who attended him were defeated, and the whole army at last dispersed with great slaughter, and obliged to shelter themselves in the towns of Acanthus, Apollonia, Spartolus, and Potidæa.

The Spartans, undismayed by this terrible disaster, next sent their king Agesipolis with a powerful reinforcement into Macedon. His presence greatly raised the spirits of the Lacedæmonian allies, and his rapid success seemed to promise a speedy termination to the war, when he himself died of a calenture. He was succeeded in the throne by his brother Cleombrotus, and in the command of the army by Polybiades an experienced general, who likewise brought along with him a powerful reinforcement. Olynthus was now completely blocked up by land, while a squadron of Lacedæmonian galleys blocked up the neighbouring harbour of Mycebernа. The Olynthians, however, held out for nine or ten months, but at last were obliged to submit on very humiliating conditions. They formally renounced all claim to the dominion of Chalcis; they ceded the Macedonian cities to their ancient governor; and in consequence of this Amyntas left the city of Ægæa or Edessa, where till now he had held his royal residence, and fixed it at Pella, a city of great strength and beauty, situated on an eminence, which, together with a plain of considerable extent, was defended by impassable morasses, and by the rivers Axius and Lydias. It was distant about 15 miles from the Ægean sea, with which it communicated by means of the abovementioned rivers. It was originally founded by the Greeks, who had lately conquered and peopled it; but in consequence of the misfortunes of Olynthus, it now became the capital of Macedon, and continued ever after to be so.

Macedon.

13 The Olynthians obliged to submit.

14 Pella made the capital of Macedon.

Amyntas, thus fully established in his dominions, continued to enjoy tranquillity during the remaining part of his life. The reign of his son Alexander was short, and disturbed by invasions of the Illyrians; from whom he was obliged to purchase a peace. He left behind him two brothers, Perdiccas and Philip, both very young; so that Pausanias again found means to usurp the throne, being supported not only by the Thracians, but a considerable number of Greek mercenaries, as well as a powerful party in Macedon itself. In this critical juncture, however, Iphicrates the Athenian happening to be on an expedition to Amphipolis, was addressed by Eurydice the widow of Amyntas, so warmly in behalf of her two sons, whom she presented to him, that he interested himself in their behalf, and got Perdiccas the eldest established on the throne. He was induced also to this piece of generosity by the kindness which Eurydice and her husband had formerly shown to himself; and he likewise saw the advantages which must ensue to his country from a connexion with Macedon. During the minority of the young prince, however, his brother Ptolemy, who was his guardian, openly aspired to the throne; but he was deposed by the Theban general Pelopidas, who reinstated Perdiccas in his dominions; and in order to secure, in the most effectual manner, the dependence of Macedon upon Thebes, carried along with him thirty Macedonian youths as hostages; and among them Philip, the younger brother of the king. Perdiccas now, elated by the protection of such powerful allies, forgot Iphicrates and the Athenians, and even disputed with them the right to the city of Amphipolis, which had been decreed to them by the general council of Greece, but which his opposition rendered impossible for them to recover. In consequence of the trust he put in these new allies, also, it is probable that he refused to Bardyllis the Illyrian the tribute which the Macedonians had been obliged to pay him; which occasioned a war with that nation. In this contest the Macedonians were defeated with the loss of 4000 men, Perdiccas himself being taken prisoner, and dying soon after of his wounds.

15 Pausanias usurps the throne.

16 Ptolemy aspires to the throne.

17 The Macedonians defeated, and their king killed by the Illyrians.

The kingdom was now left in the most deplorable state. Amyntas, the proper heir to the throne, was an infant; the Thebans, in whom Perdiccas had placed so much confidence, were deprived of the sovereignty of Greece; the Athenians, justly provoked at the ungrateful behaviour of the late monarch, showed a hos-

Macedon. tile disposition; the Illyrians ravaged the west, and the Pæonians the north quarter of the kingdom; the Thracians still supported the cause of Pausanias, and proposed to send him into Macedon at the head of a numerous army; while Argæus, the former rival of Amyntas, renewed his pretensions to the throne, and by flattering the Athenians with the hopes of recovering Amphipolis, easily induced them to support his claims; and in consequence of this they fitted out a fleet, having on board 3000 heavy-armed soldiers, which they sent to the coast of Macedon.

18 Philip arrives in Macedon.

Philip, the late king's brother, no sooner heard of his defeat and death, than he set out privately from Thebes; and on his arrival in Macedon found matters in the situation we have just now described. Fired with an insatiable ambition, it is very probable that from the very first moment he had resolved to seize the kingdom for himself; yet it was necessary at first to pretend that he assumed the throne only to preserve it for his nephew. Philip, as has already been mentioned, was carried off as a hostage by Pelopidas, but for a long time past had remained in such obscurity, that historians disagree as to his place of residence; some placing him in Thebes and others in Macedon. It is certain, however, that from the age of 15 he had been very much in the family of Epaminondas, from whose lessons he could not but derive the greatest emolument. It is probable also that he attended this celebrated general in many of his expeditions; and it is certain, that, with an attendance suitable to his rank, he visited most of the principal republics, and showed an attention to their institutions, both civil and military, far superior to his years. Having easy access to whomsoever he pleased, he cultivated the friendship of the first people in Greece. Even in Athens, where no good will subsisted with Macedon, the philosophers Plato, Isocrates, and Aristotle, cultivated his acquaintance: and the connexion he formed with the principal leaders of that republic in the early period of his life, no doubt contributed greatly to the accomplishment of the designs in which he afterwards proved so successful.

19 Retrieves the affairs of the kingdom.

His appearance in Macedon instantly changed the face of affairs: the Macedonian army, though defeated, was not entirely destroyed; and the remainder of them secured themselves in the fortresses which had been built by Archelaus. There were also considerable garrisons in the fortresses, and walled towns scattered over the kingdom; and the Illyrians, who had made war only for the sake of plunder, soon returned home to enjoy the fruits of their victory. His other enemies, the Thracians and Pæonians, were much less formidable than the Illyrians, being still in a very rude and uncivilized state, incapable of uniting under one head in such a manner as to bring any formidable army into the field. While the Illyrians therefore gave up the campaign through mere caprice and unsteadiness, Philip himself applied to the Pæonians, and by fair promises and flattery prevailed upon them to desist. The king of Thrace, by means of a sum of money, was easily prevailed upon to abandon the cause of Pausanias; so that Philip, freed from these barbarians, was now left at liberty to oppose the Athenians, who supported Argæus, and threatened a very formidable invasion.

The appearance of the Athenian fleet before Methone, with that of Argæus at the head of a numerous army in Pieria, filled the whole country with consternation; and Philip, who was by no means deficient in talents necessary to recommend himself to the good graces of the people, took the opportunity of getting Amyntas set aside, and himself declared king; for which indeed the danger of the times afforded a very plausible pretext. Argæus, in the mean time, advanced with his Athenian allies towards Edessa or Ægæ, the ancient capital of the Macedonian empire, where he hoped to have been amicably received; but finding the gates shut against him, he returned back to Methone. Philip harassed him in his retreat, cutting off great numbers of his men, and afterwards defeated him in a general engagement; in which Argæus himself, with the flower of his army, was cut in pieces, and all the rest taken prisoners. Macedon.

20 Takes upon him the sovereignty.

21 Defeats and kills Argæus an usurper.

This first instance of success contributed greatly to raise the spirits of Philip's party; and he himself took care to improve it in the best manner possible. Having taken a great number of prisoners, both Macedonians and Athenians, he determined, by his treatment of them, to ingratiate himself with both parties. The former were called into his presence, and, after a gentle reprimand, admitted to swear allegiance to him; after which they were distributed through the army: the Athenians were entertained at his table, dismissed without ransom, and their baggage restored. The prisoners were just allowed time to return to their native city and to spread abroad the news of Philip's generosity, when they were followed by ambassadors from Macedon with proposals for peace. As he knew that the loss of Amphipolis had greatly irritated them, he now thought proper to renounce his jurisdiction over that city; and it was accordingly declared free and independent, and subject only to the government of its own free and equitable laws. This artful conduct, together with his kind treatment of the prisoners, so wrought upon the minds of the Athenians, that they consented to the renewal of a treaty which had formerly subsisted between them and his father Amyntas. Thus he found means to remove all jealousy of his ambition or the schemes he might afterwards undertake to their prejudice; and not only this, but to induce them to engage in a ruinous war with their allies, which occupied their attention until Philip had an opportunity of getting his matters so well established that it was impossible to overthrow them.

22 Philip's politic treatment of the prisoners.

23 Renounces his right to Amphipolis.

The new king being thus left at liberty to regulate his domestic concerns, began to circumscribe the power of his chiefs and nobles; who, especially in the more remote provinces, paid very little regard to the authority of the kings of Macedon; sometimes, even in times of public calamity, throwing off their allegiance altogether, and assuming an independent government over considerable tracts of country. To counteract the ambition of these chiefs, Philip chose a body of the bravest Macedonian youths, whom he entertained at his own table, and honoured with many testimonies of his friendship, giving them the title of his *companions*, and allowing them constantly to attend him in war and hunting. Their intimacy with the sovereign, which was considered as an indication of their merit, obliged them to superior diligence in all the severe duties of military discipline; and the young nobility, eager to participate such high honours, vied with each other

24 Reduces the power of the nobility.

25 Chooses a number of illustrious young men for his companions.

Macedon. other in their endeavours to gain admission into this distinguished order; so that while on the one hand they served as hostages, on the other they formed an useful seminary for future generals, by whom both Philip and Alexander were afterwards greatly assisted in their conquests.

26 Whether he instituted the phalanx.

Diodorus Siculus, and all the Roman writers who have treated of the history of Greece, assert that Philip, in the first year of his reign, instituted the Macedonian phalanx; a body of 6000 men armed with short swords fitted either for cutting or stabbing, having also strong bucklers four feet long and two and a half broad, and pikes 14 feet long; usually marching 16 men deep. But this opinion is controverted by others. Dr Gillies supposes that the opinion had arisen from the Romans meeting with the phalanx in its most complete form in Macedon; and as they became acquainted with Greece and Macedon pretty nearly at the same time, it was natural for them to suppose that it had been invented among the Macedonians. The phalanx, he says, is nothing different from the armour and arrangement which had always prevailed among the Greeks, and which Philip adopted in their most perfect form; "nor is there reason (says he) to think that a prince, who knew the danger of changing what the experience of ages had approved, made any alteration in the weapons or tactics of that people. The improvement in the countermarch, to which Philip gave the appearance of advancing instead of retreating, mentioned by Ælian in his Tactics, cap. xxviii. was borrowed, as this author tells us, from the Lacedæmonians. If Philip increased the phalanx, usually less numerous, to 6000 men, this was far from an improvement; and the latter kings of Macedon, who swelled it to 16,000, only rendered that order of battle more unwieldy and inconvenient." Instead of this, Philip, according to our author, employed himself in procuring arms, horses, and other necessary materials for war; and in introducing a more severe and exact military discipline than had formerly been known in Macedon.

27 Overcomes the Pæonians and Illyrians.

While the king thus took the best methods to render himself secure at home and formidable abroad, the Pæonians again began to make incursions into the kingdom. The death of Agis their king, however, who was a man of great military skill, deprived them almost of every power of resistance when they were attacked. Philip, of consequence, overran their country with little opposition, and reduced them to the state of tributaries to Macedon. No sooner was this accomplished, than he undertook a winter's campaign against the Illyrians, who had long been the natural enemies of Macedon. They had now extended their territory to the east; by which means the Macedonians were excluded from the harbours on the coast of the Adriatic. This was a grievance to Philip, who seems early to have meditated the raising of a naval power; neither could he hope to be in safety, should the kingdom be left open to the incursions of a barbarous enemy; for which reason he determined at once to humble those enemies in such a manner that they should no longer be in a situation to give him any disturbance. After an ineffectual negociation, he was met by Bardyllis at the head of a considerable body of infantry, but with only 400 horse. They made a gallant resistance for some time; but being unable to cope with such a skilful general as Philip, they were defeated with the loss of 7000 men, among whom was their leader Bardyllis, who fell at the age of 90. Macedon.

28 They are forced to become tributary.

By this disaster the Illyrians were so much disheartened, that they sent ambassadors to Philip, humbly begging for peace on any terms. The conqueror granted them the same conditions which had been imposed upon the Pæonians, viz. the becoming tributary, and yielding up to him a considerable part of their country. That part of it which lay to the eastward of a lake named Lychnidus he annexed to Macedon; and probably built a town and settled a colony there; the country being fertile, and the lake abounding with many kinds of fish highly esteemed by the ancients. This town and lake were about 50 miles distant from the Ionian sea; and such was the ascendancy which the arms and policy of Philip acquired over his neighbours, that the inhabitants of all the intermediate district soon adopted the language and manners of their conquerors; and their territory, hitherto unconnected with any foreign power, sunk into such absolute dependence upon Macedon, that many ancient geographers supposed it to be a province of that country.

29 His great designs.

Philip had no sooner reduced the Illyrians, than he began to put in execution greater designs than any he had yet attempted. The rich coasts to the southward of Macedon, inhabited chiefly by Greeks, presented a strong temptation to his ambition and avarice. The confederacy of Olynthus, after having thrown off the yoke of Sparta, was become more powerful than ever, and could send into the field an army of 10,000 heavy armed troops, besides a number of cavalry in proportion. Most of the towns in Chalcidice were become its allies or subjects; so that this populous and wealthy province, together with Pangæus on the right and Pieria on the left, of both which the cities were either independent or subject to the Athenians, formed a barrier not only sufficient to guard against any incursions of the Macedonians, but which was even formidable to them. But though Philip was sensible enough of the importance of those places, he considered the conquest of Amphipolis as more necessary at the present time. By the possession of this place Macedon would be connected with the sea, and would be secured in many commercial advantages, which could not but contribute greatly to the prosperity of the kingdom at large; a road was likewise opened to the woods and mines of Pangæus, the former of which were so necessary to the raising of a naval power, and the latter for the establishment of a proper military force. This city had indeed been declared independent by Philip himself in the beginning of his reign; but this was only to prevent a rupture with the Athenians, who still asserted their right to it as an ancient colony; though, by reason of the perfidy of Charidemus, a native of Eubœa, they had hitherto failed in their attempts to recover it. The Amphipolitans, however, having once enjoyed the sweets of liberty, prepared to maintain themselves in their independence. In the mean time the hostile designs of Philip, which all his precaution had not been able to conceal, alarmed the inhabitants to such a degree, that they thought proper to put themselves under the protection of the Olynthians. By them they were readily received in- 30 Plans the conquest of Amphipolis.

Macedon.

to the confederacy; and trusting to the strength of their new allies, behaved in such an insolent manner to Philip, that he was not long of finding a specious pretext for hostility; at which the Olynthians, greatly alarmed, sent ambassadors to Athens, requesting their assistance against such a powerful enemy. Philip, however, justly alarmed at such a formidable conspiracy, sent agents to Athens, with such expedition that they arrived there before any thing could be concluded with the Olynthian deputies. Having gained over the popular leaders and orators, he deceived and flattered the magistrates and senate in such an artful manner, that a negociation was instantly set on foot, by which Philip engaged to conquer Amphipolis for the Athenians, upon condition that they surrendered to him the strong fortress of Pydna, a place which he represented as of much less importance to them; promising also to confer upon them many other advantages, which, however, he did not specify at that time. Thus the Athenians, deceived by the perfidy of their own magistrates, elated with the hopes of recovering Amphipolis, and outwitted by the superior policy of Philip, rejected with disdain the proffers of the Olynthians.

31 Engages to conquer it for the Athenians.

The ambassadors of Olynthus returned home highly disgusted with the reception they had met with; but had scarce time to communicate the news to their countrymen, when the ambassadors of Philip arrived at Olynthus. He pretended to condole with them on the affront they had received at Athens; but testified his surprise that they should court the assistance of that distant and haughty republic, when they could avail themselves of the powerful kingdom of Macedon, which wished for nothing more than to enter into equal and lasting engagements with their confederacy. As a proof of his moderation and sincerity, he offered to put them in possession of Anthemus, an important town in the neighbourhood, of which the Macedonians had long claimed the jurisdiction, making many other fair promises; and among the rest, that he would reduce for them the cities of Pydna and Potidæa, which he chose rather to see in dependence on Olynthus than Athens. Thus he prevailed upon the Olynthians not only to abandon Amphipolis, but to assist him with all their power in the execution of his designs.

Philip now lost no time in executing his purposes on Amphipolis; and pressed the city so closely, that the people were glad to apply to the Athenians for relief. Accordingly they despatched two of their most eminent citizens, Hierax and Stratocles, to represent the danger of an alliance betwixt Philip and the Olynthians, and to profess their sorrow for having so deeply offended the parent state. This representation had such an effect, that though the Athenians were then deeply engaged in the Social war, they would probably have paid some attention to the Amphipolitans, had not Philip taken care to send them a letter with fresh assurances of friendship, acknowledging their right to Amphipolis, and which he hoped shortly to put in their hands in terms of his recent agreement. By these specious pretences the Athenians were persuaded to pay as little regard to the deputies of the Amphipolitans as they had already done to those of the Olynthians; so that the city, unable to defend itself alone against so powerful an enemy, surrendered at last at discretion in the year 357 B. C.

32 Amphipolis surrenders.

Macedon.

Philip still proceeded in the same cautious and politic manner in which he had begun. Though the obstinate defence of the Amphipolitans might have furnished a pretence for severity, he contented himself with banishing a few of the popular leaders from whom he had most cause to dread opposition, treating the rest of the inhabitants with all manner of clemency; but took care to add Amphipolis to his own dominions, from which he was determined that it never should be separated, notwithstanding the promises he had made to the Athenians. Finding that it was not his interest at this time to fall out with the Olynthians, he cultivated the friendship of that republic with great assiduity; took the cities of Pydna and Potidæa, which he readily yielded to the Olynthians, though they had given him but little assistance in the reduction of these places. Potidæa had been garrisoned by the Athenians; and them the artful king sent back without ransom, lamenting the necessity of his affairs which obliged him contrary to his inclination, to oppose their republic. Though this was rather too gross, the Athenians at present were so much engaged with the Social war, that they had not leisure to attend to the affairs of other nations. Philip made the best use of his time, and next projected the conquest of the gold mines of Thrace. That rich and fertile country was now held by one Cotys, a prince of such weak intellectual faculties, that the superstition of the Greeks, into which he was newly initiated, had almost entirely subverted his reason; and he wandered about in quest of the goddess Minerva, with whom he fancied himself in love. The invasion of the Macedonians, however, awaked him from his reverie; and Cotys, finding himself destitute of other means of opposition, attempted to stop the progress of the enemy by a letter. To this Philip paid no regard: the Thracians were instantly expelled from their possessions at Crenidæ, where there were very valuable gold mines. These had formerly been worked by colonies from Thasos and Athens; but the colonists had long since been expelled by the barbarous Thracians, who knew not how to make use of the treasure they were in possession of. Philip took the trouble to descend into the mines himself, in order to inspect the works; and having caused them to be repaired, planted a Macedonian colony at Crenidæ, bestowed upon it the name of Philippi, and drew annually from the gold mines to the value of near 1000 talents, 200,000l. sterling; an immense sum in those days. The coins struck here were likewise called Philippi.

33 Makes himself master of the gold mines of Thrace.

Philip having obtained this valuable acquisition, next took upon him to settle the affairs of Thessaly, where every thing was in confusion. This country had been formerly oppressed by Alexander tyrant of Pheræ; after whose death three others appeared, viz. Tissiphornus, Pitholaus, and Lycophron, the brothers-in-law of Alexander, who had likewise murdered him. By the united efforts of the Thessalians and Macedonians, however, these usurpers were easily overthrown, and effectually prevented from making any disturbances for the future; and the Thessalians, out of a mistaken gratitude, surrendered to Philip all the revenues arising from

34 Settles the affairs of Thessaly greatly to his advantage.

Macedon. from their fairs and towns of commerce, as well as all the conveniences of their harbours and shipping; a concession which Philip took care to secure in the most effectual manner.

Having now not only established his sovereignty in the most effectual manner, but rendered himself very powerful and formidable to his neighbours, Philip determined to enjoy some repose from his fatigues. Having formed an alliance with Arybbas king of Epirus, he in the year 357 B. C. married Olympias the sister of that prince; a match thought the more eligible, as the kings of Epirus were supposed to be descended from Achilles. The nuptials were solemnized at Pella with great pomp, and several months were spent in shows and diversions; during which Philip showed such an extreme proneness to vice of every kind, as disgraced him in the eyes of his neighbours, and most probably laid the foundation of his future domestic unhappiness. So much was this behaviour of the Macedonian monarch taken notice of by the neighbouring states, that the Pæonians and Illyrians threw off the yoke, engaging in their schemes the king of Thrace: and notwithstanding the insane state of that prince, their designs were now carried on with more judgment than was usual with barbarians. Philip, however, notwithstanding his dissipation, got warning of his danger in sufficient time to prevent the bad consequences which might have ensued had the confederates got time to bring their matters to a proper bearing. Early in the spring 356 he took the field with the flower of the Macedonian troops. Having marched in person against the Pæonians and Thracians, he despatched Parmenio his best general into Illyria. Both enterprises proved successful; and while Philip returned victorious from Thrace, he received an account of the victory gained by Parmenio; a second messenger informed him of a victory gained by his chariot at the Olympic games; and a third, that Olympias had been delivered of a son at Pella. This was the celebrated Alexander, to whom the diviners prophesied the highest prosperity and glory, as being born in such auspicious circumstances.

35 Marries Olympias.

36 A general combination of the neighbouring princes formed against him.

37 Defeats his enemies.

38 Birth of Alexander the Great.

A short time after the birth of Alexander, Philip wrote a letter to the philosopher Aristotle, whom he chose for preceptor to his young son. The letter was written with great brevity, containing only the following words: "Know that a son is born to us. We thank the gods not so much for their gift, as for bestowing it at a time when Aristotle lives. We assure ourselves that you will form him a prince worthy of his father, and worthy of Macedon." He next set about the farther enlargement of his territories, which were already very considerable. Pæonia was now one of his provinces: on the east his dominions extended to the sea of Thasos, and on the west to the lake Lychnidus. The Thessalians were in effect subject to his jurisdiction, and the possession of Amphipolis had secured him many commercial advantages; he had a numerous and well-disciplined army, with plentiful resources for supporting such an armament, and carrying through the other schemes suggested by his ambition; though his deep and impenetrable policy rendered him more truly formidable than all these put together. His first scheme was the reduction of Olynthus, the most populous and fertile country on the borders of Macedon; after which his ambition prompted him to acquire the sovereignty of all Greece. To accomplish the former, he had hitherto courted the friendship of the Olynthians by every possible method; and without letting slip any opportunity to accomplish the latter, he deprived the Athenians gradually of several of their settlements in Thrace and Macedon. In these depredations, however, he took care always to give such appearance of justice to his actions, that his antagonists, who had studied the matter less deeply, could not find a plausible pretext for engaging in war against him, even when he had openly committed hostilities against them. Philip easily perceived that the affairs of the Greeks were coming to a crisis, and he determined to wait the event of their mutual dissensions. That event did not disappoint his hopes. The Phocians had violated the religion of those days in a most extraordinary manner; they had even ploughed up the lands consecrated to Apollo: and however they might pretend to excuse themselves by examples, the Amphictyons fulminated a decree against the Phocians, commanding the sacred lands to be laid waste, and imposing a heavy fine upon the community.

39 Aristotle appointed his preceptor.

40 Extent of the Macedonian territories.

41 Projects the conquest of Olynthus and of all Greece.

Macedon.

42 Account of the Phocian war.

By this decree all Greece was again involved in the war called *Phocian*, from the name of the city about which it commenced. Philip at the beginning of the troubles was engaged in Thrace, where a civil war had taken place among the sons of Cotys; and wherever Philip interfered, he was sure to make matters turn out to his own advantage. His encroachments at length became so enormous, that Kersobletes, the most powerful of the contending princes, agreed to cede the Thracian Chersonesus to the Athenians; who immediately sent Chares at the head of a powerful armament to take possession of it. In this expedition the town of Sestos was taken by storm, and the inhabitants cruelly treated by Chares, while Philip employed himself in the siege of Methone in Pieria. This city he likewise reduced; but the king lost an eye at the siege in the following extraordinary manner, if we may give credit to some ancient historians. A celebrated archer, named Aster, had, it seems, offered his services to Philip, being represented as such an excellent marksman, that he could hit the swiftest bird on the wing. Philip replied, that he would be of excellent use if they were to make war with starlings. Aster, disgusted with this reception, went over to the enemy, and with an arrow wounded the king in the eye. When the weapon was extracted, it was found to have on it the following inscription: "For the right eye of Philip." The king ordered the arrow to be shot back again, with another inscription importing that he would cause Aster to be hanged when the town was taken. A report was raised after Philip's death, that he had lost his eye by prying too narrowly into the amours of Olympias and Jupiter Ammon; which the vanity of his successor prompted him to cherish, as his flatterers had probably been the inventors of it.

43 Philip loses an eye at the siege of Methone.

All this time the Phocian war raged with the greatest fury, and involved in it all the states of Greece. Lycophron, one of the Thessalian tyrants, whom Philip had formerly deprived of his authority, had again found means to re-establish his authority, and his countrymen having taken part with the Phocians, Lycophron called in Onomarchus, the Phocian general, to protect

44 Is engaged in a war with Onomarchus the Phocian general.

Macedon. protect him against the power of Philip, by whom he was sensible that he would soon be attacked. The king accordingly marched into Thessaly with a considerable army, defeated Phyallus the brother of Onomarchus, whom the latter had sent into the country with a detachment of 7000 men. After this he besieged and took the city of Pegasæ, driving the enemy towards the frontiers of Phocis. Onomarchus then advanced with the whole army; and Philip, though inferior in numbers, did not decline the engagement. The Phocians at first gave ground, on which the Macedonians pursued, but in good order; but coming near a precipice, on the top of which Onomarchus had posted a detachment of soldiers, the latter rolled down stones and fragments of the rock in such a manner as did dreadful execution, and threw them into the utmost disorder. Philip, however, rallied his troops with great presence of mind, and prevented the Phocians from gaining any farther advantage than they had already done; saying, as he drew off his men, that they did not retreat through fear, but like rams, in order to strike with the greater vigour. Nor was he long before he made good his assertion; for having recruited his army with the greatest expedition, he returned into Thessaly at the head of 20,000 foot and 500 horse, where he was met by Onomarchus. The Macedonians at this time were superior in number to their enemies; and Philip moreover took care to remind them, that their quarrel was that of heaven, and that their enemies had been guilty of sacrilege, by profaning the temple of Delphi. That they might be still more animated in the cause, he put crowns of laurel on their heads. Thus fired by enthusiasm, and having besides the advantage of numbers, the Phocians were altogether unable to withstand them. They threw away their arms and fled towards the sea, where they expected to have been relieved by Chares, who, with the Athenian fleet, was nigh the shore: but in this they were disappointed, for he made no attempt to save them. Upwards of 6000 perished in the field of battle or in the pursuit, and 3000 were taken prisoners. The body of Onomarchus being found among the slain, was by order of Philip hung upon a gibbet as a mark of infamy, on account of his having polluted the temple; the bodies of the rest were thrown into the sea, as being all partakers of the same crime. The fate of the prisoners is not known, by reason of an ambiguity in a sentence of Diodorus Siculus, which may imply that they were drowned, though he does not expressly say so.

45 who defeats him;

46 but is at last defeated and killed.

47 Philip pursues his ambitious schemes.

After this victory, Philip set about the settlement of Thessaly, waiting only for an opportunity to put in execution his favourite scheme of invading Greece. In the mean time, he rejoiced to see the states weakening each other by their mutual dissensions; of which he never failed to take advantage as far as possible. He now, however, began to throw off the mask with regard to the Olynthians, whom he had long deceived with fair promises. Having detached Kersobletes from the interest of the Athenians, he established him in the sovereignty of Thrace; not out of any good will, but with a view to destroy him whenever a proper opportunity offered. Were he once possessed of the dominions of that prince, the way to Byzantium was open to him; the possession of which must have been a great temptation to Philip, who well knew how to value the importance of its situation both with respect to commerce and war: and in order to pave the way to this important conquest, he attacked the fortress of Heræum, a small and in itself unimportant place, though, by reason of its neighbourhood to Byzantium, the acquisition was valuable to Philip. The Athenians, however, at last began to perceive the designs of Philip, and determined to counteract them. For this purpose they entered into an alliance with Olynthus; and having warned Kersobletes of his danger, they ordered a powerful fleet to the defence of the Heræum. But these vigorous measures were soon counteracted by the report of Philip's death, which had been occasioned by his wound at Methone, and a distemper arising from the fatigues he had afterwards undergone. The inconstant Athenians too easily gave credit to this report; and, as if all danger had been over with his death, discontinued their preparations, and directed their whole attention to the sacred war. —This contest, instead of being ended by the death of Onomarchus, now raged with double fury. Phyallus, above mentioned, the only surviving brother of Onomarchus, undertook the cause of the Phocians; and his affairs becoming every day more and more desperate, he undertook the most unaccountable method of retrieving them which could be imagined: having converted into ready money the most precious materials belonging to the temple at Delphi, and with this treasure doubled the pay of his soldiers. But this new piece of sacrilege, he indeed brought many adventurers to his standard, though he cut off all hopes of mercy for himself or his party should he be defeated. Having the assistance of 1000 Lacedæmonians, 2000 Achæans, and 5000 Athenian foot, with 400 cavalry, he was still enabled to make a very formidable appearance; and the Phocians took the field with great prospect of success.

Macedon.

48 Is opposed by the Athenians.

49 Continuation of the Phocian war.

Philip now thought it time to throw off the mask entirely, for which the proceedings of the Athenians, particularly their league with Olynthus, furnished him with a plausible pretext; and the revenging such horrid sacrilege as had been committed at Delphi seemed to give him a title to march at the head of an army into Greece. The superstition of the Greeks, however, had not yet blinded them to such a degree, but they could easily perceive that Philip's piety was a mere pretence, and that his real design was to invade and conquer the whole country. The Athenians no sooner heard of the march of the Macedonian army, than they despatched, with all expedition, a strong guard to secure the pass of Thermopylæ; so that Philip was obliged to return greatly chagrined and disappointed. Their next step was to call an assembly, to deliberate upon the measures proper to be taken in order to restrain the ambition of the Macedonian monarch; and this assembly is rendered memorable by the first appearance of Demosthenes as an orator against Philip. Athens for some time had been in a very alarming situation. They were deeply involved in the sacred war; their northern possessions were continually insulted and plundered by Philip; while a number of his mercenary partisans drew off the public attention to such a degree, that, instead, of taking measures to counteract that ambitious prince, they amused

50 Philip engages in the quarrel.

51 Is prevented from entering Greece.

Macedon.

mused themselves with speculations about the designs of the Persian monarch, who was preparing for war against the Cyprians, Egyptians, and Phœnicians. Isocrates the celebrated orator, and Phocion the statesman, joined the multitude in their present opinion, though not from any mercenary motives, but purely from a sense of the unsteady conduct of the Athenians; who, they were assured, could not contend with a prince of the vigour and activity of Philip; and therefore exhorted them by all means to cultivate the friendship of Philip, whom they could not oppose with any probability of success. Isocrates, indeed, greatly wished for an expedition into Asia, and looked upon Philip to be the only general capable of conducting it, though at present the Grecks had no pretence for making war upon the Persians, but that of revenging former injuries: and on this subject he addressed a discourse to Philip himself; and it is even said, that Isocrates, by the power of his rhetoric, prevailed upon Philip and the Athenians to lay aside their animositics for a short time, and consent to undertake this expedition in conjunction.

52 Extreme indolence and carelessness of the Athenians.

53 Advice of Isocrates the orator to them.

54 He and Phocion are opposed by Demosthenes.

If this coalition, however, did really take place, it was of very short duration. The views of Phocion and Isocrates were violently opposed by Demosthenes. Though sensible of the corruption and degeneracy of his countrymen, he hoped to be able to rouse them from their lethargy by dint of his eloquence; a talent he had been at great pains to cultivate, and in which he is said to have excelled all men that ever existed.

55 Substance of his first discourses.

In his first addresses to the people, this celebrated orator exhorted them to awake from their indolence, and to assume the direction of their own affairs. They had been too long governed, he said, by the incapacity of a few ambitious men, to the great disadvantage as well as disgrace of the community. In the first place, an orator who had placed himself at the head of a faction of no more than 300 or 400, availed himself and his followers of the carelessness and negligence of the people, to rule them at pleasure. From a consideration of their present weakness and corruption, as well as of the designs and commotions of the neighbouring powers, he advised them to abandon all romantic and distant schemes of ambition; and instead of carrying their arms into remote countries, to prepare for repelling the attacks which might be made upon their own dominions. He insisted also upon a better regulation of their finances, a more equal distribution of the public burdens, in proportion to the abilities of those upon whom they were laid, and upon the retrenching many superfluous expences. Having pointed out in a strong light the vigorous conduct of Philip; and shown by what means he had attained to such a respectable footing in the world, he next laid down a proper plan for their military operations. He told them, that they were not yet prepared to meet Philip in the field; they must begin with protecting Olynthus and the Chersonesus, for which it would be necessary to raise a body of 2000 light armed troops, with a due proportion of cavalry, which ought to be transported under a proper convoy to the islands of Lemnos, Thasos, and Sciathos, in the neighbourhood of Macedon. In these they would enjoy all kinds of necessaries in abundance, and might avail themselves of every favourable incident, to appear at the first summons of their allies; and either to repel the incursions of the Macedonians, or harass their territories. While this was going on, more vigorous preparations might be made for war at home; and it was proposed, that only the fourth part of the Athenian citizens should enlist, and no more supplies were wanted at present but 90 talents. But notwithstanding the moderation of these proposals, and the urgent necessities of the state, it was impossible to prevail upon the indolent and careless Athenians to provide for their own safety. They appear, indeed, at this time to have been desperately sunk in effeminacy and dissipation; which disposition Philip took care to encourage to the utmost of his power. There was an assembly in the city called the *Sixty*, from their consisting originally of that number, who met expressly for the purposes of extinguishing all care about public affairs, and to intoxicate themselves with every kind of pleasure they had in their power. With this assembly Philip was so well pleased, that he sent them money to support their extravagancies; and so effectually did they answer his purposes, that all the eloquence of Demosthenes could not counteract the speeches of orators much his inferiors when backed by Macedonian gold.

Macedon.

Philip himself, as we have already hinted, was excessively debauched in his private character, and the most shameful stories are related of him by the ancient writers, particularly by Demosthenes. Theopompus, too, an author who flourished in the time of Alexander, and was rewarded and honoured by that monarch, also speaks of him in such terms as we cannot with decency relate: but these accounts, coming from the avowed enemies of the king, are scarcely to be credited; and perhaps *policy*, as well as inclination, might contribute somewhat to this scandalous behaviour, that he might thereby recommend himself to the libertines of Athens, and prevent even many of the more thinking part of the people from suspecting his designs. But in whatever excesses he might at times indulge himself, he never lost sight of his main object, the subjugation of the Greek states. On pretence of being in want of money to defray the expence of his buildings, he borrowed money at a very high price throughout the whole country; and this he found an easy matter to do, as the dissipation of the Delphic treasures had rendered cash very plentiful in Greece. Thus he attached his creditors firmly to his own interest; and on pretence of paying debts, was enabled without molestation to bestow a number of pensions and gratuities upon the Athenian orators, who by their treacherous harangues contributed greatly to the ruin of their country; at least as far as it could be ruined by subjection to a prince who would have obliged them to remain at peace, and apply themselves to useful arts. These he himself encouraged in a very eminent degree. The greatest part of his time was employed at Pella, which city he adorned in the most magnificent manner with temples, theatres, and porticoes. He invited by liberal rewards, the most ingenious artists in Greece; and as many of these met with very little encouragement in their own country, great numbers flocked to him from all quarters. In the government of his people, also, Philip behaved with the utmost impartiality: listening with condescension to the complaints of the meanest

Macedon. meanest of his subjects, and keeping up a constant correspondence with those whom he thought worthy of his acquaintance; from which, it is not easy to imagine how he could be so guilty of the vices we have already mentioned from some ancient historians.

The fate of Olynthus was now soon determined. This city, which held the balance of power betwixt Athens and Macedon, was taken and plundered, and the inhabitants sold for slaves; but the chief hope of Philip was in putting an end to the Phocian war. For this purpose he affected a neutrality, that he might thereby become the arbiter of Greece. His hopes were well founded; for the Thebans, who were at the head of the league against the Phocians, solicited him on the one side, and the states confederate with the Phocians did the like on the other. He answered neither, yet held both in dependence. In his heart he favoured the Thebans, or rather placed his hopes of favouring his own cause in that state; for he well knew, that the Athenians, Spartans, and other states allied with Phocis, would never allow him to pass Thermopylæ, and lead an army into their territories. So much respect, however, did he show to the ambassadors from these states, particularly Ctesiphon and Phrynon, who came from Athens, that they believed him to be in their interest, and reported as much to their masters. The Athenians, who were now dissolved in ease and luxury, received this news with great satisfaction; and named immediately ten plenipotentiaries to go and treat of a full and lasting peace with Philip. Among these plenipotentiaries were Demosthenes and Æschines, the most celebrated orators in Athens. Philip gave directions that these ambassadors should be treated with the utmost civility; naming, at the same time, three of his ministers to confer with them, viz. Antipater, Parmenio, and Euryloehus. Demosthenes being obliged to return to Athens, recommended it to his colleagues not to carry on their negociations with Philip's deputies; but to proceed with all diligence to court, there to confer with the king himself. The ambassadors, however, were so far from following his instructions, that they suffered themselves to be put off for three months by the arts of Philip and his ministers.

56 Overreaches the Athenians, and at last concludes a peace.

In the mean time, the king took from the Athenians such places in Thrace as might best cover his frontiers; giving their plenipotentiaries, in their stead, abundance of fair promises, and the strongest assurances that his good will should be as beneficial to them as ever their colonies had been. At last a peace was concluded; but then the ratification of it was deferred till Philip had possessed himself of Pherea in Thessaly, and saw himself at the head of a numerous army: then he ratified the treaty; and dismissed the plenipotentiaries with assurances, that he would be ready at all times to give the Athenians proofs of his friendship. On their return to Athens, when this matter came to be debated before the people, Demosthenes plainly told them, that, in his opinion, the promises of Philip ought not to be relied on, because they appeared to be of little signification in themselves, and came from a prince of so much art, and so little fidelity, that they could derive no authority from their maker. Æschines, on the other hand, gave it as his sentiment, that the king of Macedon's assurances ought to give them full satisfaction. He said, that for his part, he was not politician enough to see any thing of disguise or dissimulation in the king's conduct; that there was great danger in distrusting princes; and that the surest method of putting men upon deceit was to show that we suspected them of it. The rest of the plenipotentiaries concurred with Æschines; and the people, desirous of quiet, and addicted to pleasure, easily gave credit to all that was said, and decreed that the peace should be kept. All this was the easier brought about, because Phocion, the worthiest man in the republic, did not oppose Philip; which was owing to his having a just sense of the state his country was in. He conceived, that the Athenians of those times were nothing like their ancestors; and therefore, as he expressed himself on another occasion, he was desirous, since they would not be at the head of Greece themselves, that they would at least be upon good terms with that power which would be so. Macedon.

57 Passes Thermopylæ, and ends the Phocian war.

Philip, who knew how to use as well as to procure opportunity, while the Athenians were in this good humour, passed Thermopylæ, without their knowing whether he would fall on Phocis or Thebes; but he quickly undeceived them, by commanding his soldiers to put on crowns of laurel, declaring them thereby the troops of Apollo, and himself the lieutenant-general of that god. He then entered Phocis with an air of triumph; which so terrified the Phocians, whom he had caused to be proclaimed sacrilegious persons, that they immediately dismissed all thoughts of defence, and without more ado submitted to his mercy. Thus the Phocian war, which had so long employed all Greece, was ended without a stroke; and the judgement on the Phocians remitted to the Amphictyons, or grand council of Greece. By their decree the walls of three Phocian cities were demolished, the people were forbid to inhabit in any but villages, to pay a yearly tribute of 60 talents, and never to make use either of horses or arms till they had repaid to the temple of Apollo the money they had sacrilegiously carried from thence. Their arms were taken from them, broken to pieces, and burnt; their double voice in the council was taken from them, and given to the Macedonians. Other orders were made for settling the affairs both of religion and state throughout Greece: all of which were executed by Philip with great exactness and moderation, he paying the most profound respect to the council; and, when he had performed its commands, retiring peaceably with his army back to Macedon, which gained him great reputation.

At Athens alone, the justice and piety of Philip was not understood. The people began to see, though a little too late, that they had been abused and deceived by those who had negociated the late peace. They saw that, through their acceptance of it, the Phocians were destroyed; that Philip was become master of Thermopylæ, and might enter Greece when he pleased; that, in abandoning their allies, they had abandoned themselves; and that, in all probability, they might soon feel the weight of his power, whom they had so foolishly trusted: they therefore began to take new and hostile measures; they ordered that the women should retire out of the villages into the city, their walls be repaired, and their forts new strengthened.

58 Is again opposed by the Athenians.

Macedon. ed. They seemed inclined to question Philip's election into the council of the Amphictyons, because it had been done without their consent; and even to proceed to an open war. In all likelihood they had carried things to extravagancy, if Demosthenes had not interposed. He told them, that though he was not for making the peace, he was however for keeping it; and that he saw no manner of occasion for their entering into so unequal a contest as would needs ensue, if they took up arms, not only against Philip, but against all the states concurring with him in the late transactions. This seems to have cooled the rage of the Athenians; and to have brought them to think of *ruining* Philip by degrees, as by degrees they had *raised* him.

59 Pursues his conquests in Thrace. The fame of his achievements without the bounds of Macedon having disposed the subjects of Philip to hope every thing from his conduct, and the several states of Greece to desire above all things his friendship; that prudent monarch laid hold of this favourable situation to fix his dominion on such a stable foundation as that a reverse of fortune should not immediately destroy it. To this end, while he carried on his negociations through Greece, he likewise kept his army in exercise, by taking several places in Thrace, which terribly incommoded the Athenians. Diopithes, who had the government of the Athenian colonies in those parts, perceiving well what end Philip had in view, did not stay for instructions from home; but having raised with much expedition a considerable body of troops, taking advantage of the king's being absent with his army, entered the adjacent territories of Philip, and wasted them with fire and sword.

60 His dominions invaded by Diopithes;

The king, who, on account of the operations of the campaign in the Chersonese, was not at leisure to repel Diopithes by force, nor indeed could divide his army without imminent hazard, chose, like an able general, rather to abandon his provinces to insults, which might be afterwards revenged, than, by following the dictates of an ill-timed passion, to hazard the loss of his veteran army, whereon lay all his hopes. He contented himself, therefore, with complaining to the Athenians of Diopithes's conduct, who, in a time of peace had entered his dominions, and committed such devastations as could scarcely have been justified in a time of war. His partisans supported this application with all their eloquence. They told the Athenians, that unless they recalled Diopithes, and brought him to a trial for this infriugement of the peace, they ought not to hope either for the friendship of Philip or of any other prince or state; neither could they justly complain, if, prompted by such a precedent, others should break faith with them, and fall without the least notice upon their dominions. Demosthenes defended Diopithes: and undertook to show that he deserved the praise and not the censure of the Athenians. Those of the other party began then to charge him with crimes of a different nature; they alleged, that he oppressed the subjects and maltreated the allies of Athens. Demosthenes replied, that of these things there were as yet no proofs; that when such should appear, a single galley might be sent to bring over Diopithes to abide their judgment, but that Philip would not come if they sent a fleet: whence he inferred,

61 Who is defended by Demosthenes.

that they ought to be cautious, and to weigh well the merits of this cause before they took any resolution. He said, that it was true Philip had not as yet attacked Attica, or pretended to make a descent on their territories in Greece, or to force his way into their ports; when it came to that, he was of opinion they would be hardly able to defend themselves; wherefore he thought such men were to be esteemed as fought to protect their frontiers, in order to keep Philip as long as might be at a distance: whereupon he moved, that, instead of disowning what Diopithes had done, or directing him to dismiss his army, they should send him over recruits, and show the king of Macedon they knew how to protect their territories, and to maintain the dignity of their state, as well as their ancestors. These arguments had such an effect, that a decree was made conformable to his motion. Macedon.

While affairs stood thus, the Illyrians recovering courage, and seeing Philip at such a distance, harassed the frontiers of Macedon, and threatened a formidable invasion: but Philip, by quick marches, arrived on the borders of Illyricum: and struck this barbarous people with such a panic, that they were glad to compound for their former depredations at the price he was pleased to set. Most of the Greek cities in Thrace now sought the friendship of the king, and entered into a league with him for their mutual defence. As it cannot be supposed that each of these free cities had a power equal to that of Philip, we may therefore look upon him as their protector. About this time Philip's negociations in Peloponnesus began to come to light; the Argives and Messenians, growing weary of that tyrannical authority which the Spartans exercised over them, applied to Thebes for assistance; and the Thebans out of their natural aversion to Sparta, sought to open a passage for Philip into Peloponnesus, that, in conjunction with them, he might humble the Lacedæmonians. Philip readily accepted the offer; and resolved to procure a decree from the Amphictyons, directing the Lacedæmonians to leave Argos and Messene free; which if they complied not with, he, as the lieutenant of the Amphictyons, might, with great appearance of justice, march with a body of troops to enforce their order. When Sparta had intelligence of this, she immediately applied to Athens, earnestly entreating assistance, as in the common cause of Greece. The Argives and Messenians, on the other hand, laboured assiduously to gain the Athenians to their side; alleging that, if they were friends to liberty, they ought to assist those whose only aim was to be free. Demosthenes, at this juncture, outwrestled Philip, if we may borrow that king's expression; for, by a vehement harangue, he not only determined his own citizens to become the avowed enemies of the king, but also made the Argives and Messenians not over fond of him for an ally; which when Philip perceived, he laid aside all thoughts of this enterprise for the present, and began to practise in Eubœa. 62 Philip's schemes defeated.

This county, now called *Negropont*, is separated from Greece by the Euripus, a strait so narrow, that Eubœa might easily be united to the continent. This situation made Philip call it *the fetters of Greece*, which he therefore sought to have in his own hands. There had been for some years great disturbances in that country: under colour of which, Philip sent forces thither,

Macedon. thither, and demolished Porthmos, the strongest city in those parts, leaving the country under the government of three lords, whom Demosthenes roundly calls *tyrants*, established by Philip. Shortly after, the Macedonians took Oreus, which was left under the government of five magistrates, styled also *tyrants* at Athens. Thither Plutarch of Eretria, one of the most eminent persons in Eubœa, went to represent the distresses of his country, and to implore the Athenians to set it free. This suit Demosthenes recommended warmly to the people; who sent thither their famous leader Phocion, supported by formidable votes, but a very slender army: yet so well did he manage the affairs of the commonwealth and her allies, that Philip quickly found he must for a time abandon that project; which, however, he did not till he had formed another no less beneficial to himself, or less dangerous to Athens. It was the prosecution of his conquests in Thrace which he thought of pushing much farther than he had hitherto done, or could be reasonably suspected to have any intention of doing.

Extraordinary preparations were made by the Macedonian monarch for this campaign. His son Alexander was left regent of the kingdom; and he himself with 30,000 men laid siege to Perinthus, one of the strongest cities in the country. At present, however, all his arts of cajoling and pretending friendship were insufficient to deceive the Athenians. They gave the command of their army and fleet to Phocion; a general of great abilities, and with whom Philip would have found it very hard to contend. On the other hand, the king of Persia began to turn jealous of the growing power of the Macedonian monarch. The Persian kings had been accustomed to regard those of Macedon as their faithful allies; but the good fortune of Philip, the continual clamour of the Athenians against him, and his dethroning at pleasure the petty princes of Thrace, made him now regarded in another light. When, therefore, he led his troops against Perinthus, *the Great King*, as he was styled by the Greeks, sent his letters mandatory to the governors of the maritime provinces, directing them to supply the place with all things in their power; in consequence of which they filled it with troops, granted subsidies in ready money, and sent besides great convoys of provision and ammunition. The Byzantines also, supposing their own turn would be next, exerted their utmost endeavours for the preservation of Perinthus; sending thither the flower of their youth, with all other necessaries for an obstinate defence. The consequence of all this was, that Philip found himself obliged to raise the siege with great loss.

63 How he at last gained his point.

That the reputation of the Macedonian arms might not sink by this disgrace, Philip made war on the Scythians and Triballi, both of whom he defeated; and then formed a design of invading Attica, though he had no fleet to transport his troops, and knew very well that the Thessalians were not to be depended upon if he attempted to march through the Pisæ, and that the Thebans would even then be ready to oppose his march. To obviate all these difficulties, he had recourse to Athens itself; where by means of his partisans, he procured his old friend Æschines to be sent their deputy to the Amphictyons. This seemed a small matter, and yet was the hinge on which his whole project turned. By that time Æschines had taken his seat, a question was stirred in the council, whether the Locrians of Amphisia had not been guilty of sacrilege in ploughing the fields of Cyrrha in the neighbourhood of the temple of Delphi. The assembly being divided in their opinions, Æschines proposed to take a view, which was accordingly decreed. But when the Amphictyons came in order to see how things stood, the Locrians, either jealous of their property, or spurred thereto by the suggestions of some who saw farther than themselves, fell upon those venerable persons so rudely, that they were compelled to secure themselves by flight. The Amphictyons decreed, that an army should be raised, under the command of one of their own number, to chastise the delinquents; but as this army was to be composed of troops sent from all parts of Greece, the appearance at the rendezvous was so inconsiderable, that the Amphictyons sent to command them durst undertake nothing. The whole matter being reported to the council, Æschines, in a long and eloquent harangue, showed how much the welfare and even the safety of Greece depended on the deference paid to their decrees; and after inveighing against the want of public spirit in such as had not sent their quotas at the time appointed by the council, he moved that they should elect Philip for their general, and pray him to execute their decree. The deputies from the other states, conceiving that by this expedient their respective constituents would be free from any farther trouble or expence, came into it at once; whereupon a decree was immediately drawn up, purporting that ambassadors should be sent to Philip of Macedon, in the name of Apollo and the Amphictyons, once more to require his assistance, and to notify to him, that the states of Greece had unanimously chosen him their general, with full power to act as he thought fit against such as had opposed the authority of the Amphictyons. Thus of a sudden Philip acquired all that he sought; and having an army ready in expectation of this event, he immediately marched to execute the commands of the Amphictyons in appearance, but in reality to accomplish his own designs: For having passed into Greece with his army, instead of attacking the Locrians, he seized immediately upon Elatea, a great city of Phocis upon the river Cephisus.

Macedon

64 Is chosen general by the Amphictyons.

65 Is opposed by the Athenians and Thebans;

The Athenians in the mean time were in the utmost confusion on the news of Philip's march. However, by the advice of Demosthenes, they invited the Thebans to join them against the common enemy of Greece. Philip endeavoured as much as possible to prevent this confederacy from taking place; but all his efforts proved ineffectual. The Athenians raised an army, which marched immediately to Eleusis, where they were joined by the Thebans. The confederates made the best appearance that had ever been seen in Greece, and the troops were exceedingly good; but unfortunately the generals were men of no conduct or skill in the military art. An engagement ensued at Cheronæa; wherein Alexander commanded one wing of the Macedonian army, and his father Philip the other. The confederate army was divided according to the different nations of which it consisted; the Athenians having the right and the Bœotians the left. In the beginning of the battle the confederates had the better; whereupon

66 whom he defeats at Cheronæa.

Macedon. upon Stratocles an Athenian commander cried out, "Come on, brother soldiers, let us drive them back to Macedon;" which being overheard by the king, he said very coolly to one of his officers, "These Athenians do not know how to conquer." Upon this he directed the files of the phalanx to be straitened; and drawing his men up very close, retired to a neighbouring eminence: from whence, when the Athenians were eager in their pursuit, he rushed down with impetuosity, broke, and routed them with prodigious slaughter. The orator Demosthenes behaved very unbecomingly in this engagement; for he deserted his post, and was one of the first that fled: nay, we are told, that a stake catching hold of his robe, he, not doubting but it was an enemy, cried out, "Alas! spare my life."

67 Is appointed general against the Persians.

This victory determined the fate of Greece; and from this time we must reckon Philip supreme lord of all the Grecian states. The first use he made of his power was to convoke a general assembly, wherein he was recognized generalissimo, and with full power appointed their leader against the Persians. Having, by virtue of his authority, settled a general peace among them, and appointed the quota that each of the states should furnish for the war, he dismissed them: and returning to Macedon, began to make great preparations for this new expedition. His pretence for making war on the Persians at this time was the assistance given by the Persians to the city of Perinthus, as already mentioned. In the mean time, however, the king by reason of the dissensions which reigned in his family, was made quite miserable. He quarrelled with his wife Olympias to such a degree, that he divorced her, and married another woman named *Cleopatra*. This produced a quarrel between him and his son Alexander; which also came to such a height, that Alexander retired into Epirus with his mother. Some time afterwards, however, he was recalled, and a reconciliation took place in appearance; but in the mean time a conspiracy was formed against the king's life, the circumstances and causes of which are very much unknown. Certain it is, however, that it took effect, as the king was exhibiting certain shows in honour of his daughter's marriage with the king of Epirus. Philip having given a public audience to the ambassadors of Greece, went next day in state to the theatre. All the seats were early taken up; and the shows began with a splendid procession, wherein the images of the 12 superior deities of Greece were carried, as also the image of Philip, habited in like manner, as if he now made the 13th, at which the people shouted aloud. Then came the king alone, in a white robe, crowned, with his guards at a considerable distance, that the Greeks might see he placed his safety only in his confidence of the loyalty of his subjects. Pausanias, the assassin, however, had fixed himself close by the door of the theatre; and observing that all things fell out as he had foreseen they would, took his opportunity when the king drew near him, and plunging his sword in his left side, laid him dead at his feet. He then fled as fast as he was able towards the place where his horses were; and would have escaped, had not the twig of a vine catched his shoe and thrown him down. This gave time to those who pursued him to come up with him; but instead of securing him, in order to extort a discovery of his accomplices, they put an end to his life.

63 Is murdered.

Macedon.

With regard to the character of this monarch, it appears certain, that he was one of the most eminent persons that ever sat on a throne. Had he lived for some time longer, he would in all probability have subdued the Persians: which was in truth less difficult than what he had already done. "Had that event taken place (says Dr Gillies), the undertakings of his long and successful reign would have been ennobled and illuminated by the splendour of extensive foreign conquest. Philip would have reached the height of such renown as is obtained by the habits of activity, vigilance, and fortitude, in the pursuit of unbounded greatness; and in the opinion of posterity, would perhaps have surpassed the glory of all kings and conquerors who either preceded or followed him. Yet, even on this supposition, there is not any man of sense and probity, who, if he allows himself time for serious reflection, would purchase the imagined grandeur and prosperity of the king of Macedon at the price of his artifices and his crimes; and to a philosopher, who considered either the means by which he had obtained his triumphs, or the probable consequences of his dominion over Greece and Asia, the busy ambition of this mighty conqueror would appear but a deceitful scene of splendid misery."

69 His character.

70 Extravagant joy of the Athenians.

No sooner did the news of Philip's death reach Athens, than, as if all danger had been past, the inhabitants showed the most extravagant signs of joy. Demosthenes and his party put on chaplets of flowers, and behaved as if they had gained a great victory. Phocion reproved them for this madness; bidding them remember, that "the army which had beaten them at Chæronæa was lessened but by one." This reproof, however, had very little effect. The people heard with pleasure all the harsh things which the orators could say of the young Alexander king of Macedon, whom they represented as a giddy wrong-headed boy, ready to grasp all things in his imagination, and able to perform nothing. The affairs of Macedon indeed were in a very distracted state on the accession of Alexander: for all the neighbouring nations had the same notion of the young king with the Athenians; and being irritated by the usurpations of Philip, immediately revolted; and the states of Greece entered into a confederacy against him. The Persians had been contriving to transfer the war to Macedon; but as soon as the news of Philip's death reached them, they behaved as if all danger had been over. At the same time Attalus, one of the Macedonian commanders, aspired to the crown, and sought to draw off the soldiers from their allegiance.

In the councils held on this occasion, Alexander's best friends advised him rather to make use of dissimulation than force, and to cajole those whom they thought he could not subdue. These advices, however, were ill suited to the temper of their monarch. He thought that vigorous measures only were proper, and therefore immediately led his army into Thessaly. Here he harangued the princes so effectually, that he thoroughly gained them over to his interest, and was by them declared general of Greece; upon which he returned to Macedon, where he caused Attalus to be seized and put to death.

71 Alexander declared general of Greece.

Macedon. In the spring of the next year (335 B. C.) Alexander resolved to subdue the Triballians and Illyrians, who inhabited the countries now called *Bulgaria* and *Sclavonia*, and had been very formidable enemies to the Macedonian power. In this expedition he discovered, though then but 20 years of age, a surprising degree of military knowledge. Having advanced to the passes of Mount Hæmus, he found that the barbarians had posted themselves in the most advantageous manner. On the tops of the cliffs, and at the head of every passage, they had placed their carriages and waggons in such a manner as to form a kind of parapet with their shafts inwards, that when the Macedonians should have half ascended the rock, they might be able to push these heavy carriages down upon them. They reckoned the more upon this contrivance, because of the close order of the phalanx, which, they imagined, would be terribly exposed by the soldiers wanting room to stir, and thereby avoid the falling waggons. But Alexander, having directed his heavy-armed troops to march, gave orders, that, where the way would permit, they should open to the right and left, and suffer the carriages to go through; but that, in the narrow passes, they should throw themselves on their faces with their shields behind them, that the carts might run over them. This had the desired effect; and the Macedonians reached the enemies works without the loss of a man. The dispute was then quickly decided; the barbarians were driven from their posts with great slaughter, and left behind them a considerably booty for the conquerors.

72 Defeats the Triballi.

The next exploits of Alexander were against the Getæ, the Tanlantii, and some other nations inhabiting the country on the other side of the Danube. Them he also overcame; showing in all his actions the most perfect skill in military affairs, joined with the greatest valour. In the mean time, however, all Greece was in commotion by a report which had been confidently spread abroad, that the king was dead in Illyria. The Thebans, on this news, seized Amyntas and Timolaus, two eminent officers in the Macedonian garrison which held their citadel, and dragged them to the market-place, where they were put to death without either form or process, or any crime alleged against them. Alexander, however, did not suffer them to remain long in their mistake. He marched with such expedition, that in seven days he reached Pallene in Thessaly; and in six days more he entered Bœotia, before the Thebans had any intelligence of his passing the straits of Thermopylæ. Even then they would not believe that the king was alive; but insisted that the Macedonian army was commanded by Antipater, or by one Alexander the son of Æropus. The rest of the Greeks, however, were not so hard of belief; and therefore sent no assistance to the Thebans, who were thus obliged to bear the consequences of their own folly and obstinacy. The city was taken by storm, and the inhabitants were for some hours massacred without distinction of age or sex; after which the houses were demolished, all except that of Pindar the famous poet, which was spared out of respect to the merit of its owner, and because he had celebrated Alexander king of Macedon. The lands, excepting those destined to religious uses, were shared among the soldiers, and all the prisoners sold for slaves; by which 440 talents were brought into the king's treasury.

73 The Thebans revolt on the news of his death.

74 Thebes taken and destroyed.

Macedon.

By this severity the rest of the Grecian states were so thoroughly humbled, that they thought no more of making any resistance, and Alexander had nothing further to hinder him from his favourite project of invading Asia. Very little preparation was necessary for the Macedonian monarch, who went out as to an assured conquest, and reckoned upon being supplied only by the spoils of his enemies. Historians are not agreed as to the number of his army: Arrian says, that there were 30,000 foot and 5000 horse. Diodorus Siculus tells us, that there were 13,000 Macedonian foot, 7000 of the confederate states, and 5000 mercenaries. These were under the command of Parmenio. Of the Odrisians, Triballians, and Illyrians, there were 5000; and of the Agrians, who were armed only with darts, 1000. As for the horse, he tells us there were 1800 commanded by Philotas, and as many Thessalians under the command of Callas: out of the confederate states of Greece, were 600 commanded by Eurygius; and 900 Thracians and Pæonians, who led the van under Cassander. Plutarch tells us, that, according to a low computation, he had 30,000 foot and 5000 horse; and, according to the largest reckoning, he had 34,000 foot and 4000 horse. As to his fund for the payment of the army, Aristobulus says it was but 70 talents; and Onesicritus, who was also in this expedition, not only takes away the 70 talents, but affirms that the king was 200 in debt. As for provisions, there was just sufficient for a month and no more; and to prevent disturbances, Antipater was left in Macedon with 12,000 foot and 1500 horse.

75 Number of the army with which he invaded Asia.

The army having assembled at Amphipolis, he marched from thence to the mouths of the river Strymon; then crossing Mount Pangæus, he took the road to Abdera. Crossing the river Ebrus, he proceeded through the country of Pætis, and in 20 days reached Sestos; thence he came to Eleus, where he sacrificed on the tomb of Protesilaus, because he was the first among the Greeks who at the siege of Troy set foot on the Asiatic shore. He did this, that his landing might be more propitious than that of the hero to whom he sacrificed, who was slain soon after. The greatest part of the army, under the command of Parmenio, embarked at Sestos, on board of a fleet of 160 galleys of three benches of oars, besides small craft. Alexander himself sailed from Eleus; and when he was in the middle of the Hellespont, offered a bull to Neptune and the Nereids, pouring forth at the same time a libation from a golden cup. When he drew near the shore, he launched a javelin, which stuck in the earth: then, in complete armour, he leaped upon the strand; and having erected altars to Jupiter, Minerva, and Hercules, he proceeded to Ilium. Here again he sacrificed to Minerva; and taking down some arms which had hung in the temple of that goddess since the time of the Trojan war, consecrated his own in their stead. He sacrificed also to the ghost of Priam, to avert his wrath on account of the descent which he himself claimed from Achilles.

76 Sets out on his expedition.

In the mean time the Persians had assembled a great army in Phrygia; among whom was one Memnon a Rhodian, the best officer in the service of Darius. Alexander,

Macedon. lexander, as soon as he had performed all the ceremonies which he judged necessary, marched directly towards the enemy. Memnon gave it as his opinion, that they should burn and destroy all the country round, that they might deprive the Greeks of the means of subsisting, and then transport a part of their army into Macedon. But the Persians, depending on their cavalry, rejected this salutary advice; and posted themselves along the river Granicus, in order to wait the arrival of Alexander. In the engagement which happened on the banks of that river, the Persians were defeated *, and Alexander became master of all the neighbouring country; which he immediately began to take care of, as if it had been part of his hereditary dominions. The city of Sardis was immediately delivered up; and here Alexander built a temple to Jupiter Olympius. After this, he restored the Ephesians to their liberty; ordered the tribute which they formerly paid to the Persians to be applied towards the rebuilding the magnificent temple of Diana: and having settled the affairs of the city, marched against Miletus. This place was defended by Memnon with a considerable body of troops who had fled thither after the battle of Granicus, and therefore made a vigorous resistance. The fortune of Alexander, however, prevailed; and the city was soon reduced, though Memnon with part of the troops escaped to Halicarnassus. After this, the king dismissed his fleet, for which various reasons have been assigned; though it is probable, that the chief one was to show his army that their only resource now was in subverting the Persian empire.

* See *Granicus.*

77 Consequences of his first victory.

Almost all the cities between Miletus and Halicarnassus submitted as soon as they heard that the former was taken; but Halicarnassus, where Memnon commanded with a very numerous garrison, made an obstinate defence. Nothing, however, was able to resist the Macedonian army. Memnon was at last obliged to abandon the place; upon which Alexander took and razed the city of Tralles in Phrygia; received the submission of several princes tributary to the Persians; and having destroyed the Marmarians, a people of Lycia who had fallen upon the rear of his army, put an end to the campaign; after which he sent home all the new married men; in obedience, it would seem, to a precept of the Mosaic law, and which endeared him more to his soldiers than any other action of his life.

As soon as the season would permit, Alexander quitted the province of Phaselus; and having sent part of his army through the mountainous country to Perga, by a short but difficult road, took his route by a certain promontory, where the way is altogether impassable, except when the north winds blow. At the time of the king's march the south wind had held for a long time; but of a sudden it changed, and blew from the north so violently, that, as he and his followers declared, they obtained a safe and easy passage through the Divine assistance. By many this march is held to be miraculous, and compared to that of the children of Israel through the Red sea; while, on the other hand, it is the opinion of others, that there was nothing at all extraordinary in it. He continued his march towards Gordium, a city of Phrygia; the enemy having abandoned the strong pass of Telmissus, through which it was necessary for him to march. When he arrived at Gordium, and found himself under a necessity of staying some time there till the several corps of his army could be united, he expressed a strong desire of seeing Gordius's chariot, and the famous knot in the harness, of which such strange stories had been published to the world. The cord in which this knot was tied, was made of the inner rind of the cornel tree; and no eye could perceive where it had begun or ended. Alexander, when he could find no possible way of untying, and yet was unwilling to leave it tied lest it should cause some fears in the breasts of his soldiers, is said by some authors to have cut the cords with his sword, saying, "It matters not how it is undone." But Aristobulus assures us, that the king wrested a wooden pin out of the beam of the waggon, which, being driven in across the beam, held it up; and so took the yoke from under it. Be this as it will, however, Arrian informs us, that a great tempest of thunder, lightning, and rain, happening the succeeding night, it was held declarative of the true solution of this knot, and that Alexander should become lord of Asia.

Macedon.

73 Unties the Gordian knot.

The king having left Gordium, marched towards Cilicia; where he was attended with his usual good fortune, the Persians abandoning all the strong passes as he advanced. As soon as he entered the province, he received advice that Arsames, whom Darius had made governor of Tarsus, was about to abandon it, and that the inhabitants were very apprehensive that he intended to plunder them before he withdrew. To prevent this, the king marched incessantly, and arrived just in time to save the city. But his saving it had well nigh cost him his life: for, either through the excessive fatigue of marching, as some say, or, according to others, by his plunging when very hot into the river Cydnus, which, as it runs through thick shades, has its waters excessively cold, he fell into such a distemper as threatened his immediate dissolution. His army lost their spirits immediately; the generals knew not what to do; and his physicians were so much affrighted, that the terror of his death hindered them from using the necessary methods for preserving his life. Philip the Acarnanian alone preserved temper enough to examine the nature of the king's disease; the worst symptom of which was a continual waking, and which he took off by means of a potion, and in a short time the king recovered his usual health.

79 His sickness and recovery.

Soon after Alexander's recovery, he received the agreeable news that Ptolemy and Asander had defeated the Persian generals, and made great conquests on the Hellespont; a little after that, he met the Persian army at Issus, commanded by Darius himself. A bloody engagement ensued, in which the Persians were defeated with great slaughter, as related under the article Issus. The consequences of this victory were very advantageous to the Macedonians. Many governors of provinces and petty princes submitted themselves to the conqueror; and such as did so were treated, not as a newly conquered people, but as his old hereditary subjects; being neither burdened with soldiers nor oppressed with tribute. Among the number of those places which, within a short space after the battle of Issus, sent deputies to submit to the conqueror, was the city of Tyre. The king, whose name was Azel-

nicus,

Macedon.

mieus, was absent in the Persian fleet; but his son was among the deputies, and was very favourably received by Alexander. The king probably intended to confer particular honours on the city of Tyre; for he acquainted the inhabitants that he would come and sacrifice to the Tyrian Hercules, the patron of their city, to whom they had erected a most magnificent temple. But these people, like most other trading nations, were too suspicious to think of admitting such an enterprising prince with his troops within their walls. They sent therefore their deputies again to him, to inform him, that they were ready to do whatever he should command them; but, as to his coming and sacrificing in their city, they could not consent to that, but were positively determined not to admit a single Macedonian within their gates. Alexander immediately dismissed their deputies in great displeasure. He then assembled a council of war, wherein he insisted strongly on the disaffected state of Greece (for most of the Grecian states had sent ambassadors to Darius, to enter into a league with him against the Macedonians), the power of the Persians by sea, and the folly of carrying on the war in distant provinces, while Tyre was left unreduced behind them: he also remarked, that if once this city was subdued, the sovereignty of the sea would be transferred to them, because it would fix their possession of the coasts; and as the Persian fleet was composed chiefly of tributary squadrons, those tributaries would fight the battles, not of their late, but of their present masters. For these reasons the siege of Tyre was resolved on. The town was not taken, however, without great difficulty; which provoked Alexander to such a degree, that he treated the inhabitants with the greatest cruelty. See TYRE.

80 Tyre taken and destroyed.

After the reduction of Tyre, Alexander, though the season was already far advanced, resolved to make an expedition into Syria; and in his way thither proposed to chastise the Jews, who had highly offended him during the siege of Tyre: for when he sent to them to demand provisions for his soldiers, they answered, That they were the subjects of Darius, and bound by oath not to supply his enemies. The king, however, was pacified by their submission; and not only pardoned them, but conferred many privileges upon them, as related under the article JEWS.

81 Egypt submits.

From Jerusalem Alexander marched directly to Gaza, the only place in that part of the world which still held out for Darius. This was a very large and strong city, situated on a high hill, about five miles from the sea-shore. One *Batis* or *Betis*, an eunuch, had the government of the place; and had made every preparation necessary for sustaining a long and obstinate siege. The governor defended the place with great valour, and several times repulsed his enemies; but at last it was taken by storm, and all the garrison slain to a man; and this secured to Alexander an entrance into Egypt, which having before been very impatient of the Persian yoke, admitted the Macedonians peaceably.

82 Alexander visits the temple of Jupiter Ammon.

Here the king laid the foundations of the city of Alexandria, which for many years after continued to be the capital of the country. While he remained here, he also formed the extraordinary design of visiting the temple of Jupiter Ammon. As to the motives by which he was induced to take this extraordinary journey, authors are not agreed; but certain it is, that he hazarded himself and his troops in the highest degree; there being two dangers in this march, which, with the example of Cambyses, who lost the greatest part of his army in it, might have terrified any body but Alexander. The first was the want of water, which, in the sandy deserts surrounding the temple, is nowhere to be found; the other, the uncertainty of the road from the fluctuation of the sands; which changing their situation every moment, leave the traveller neither a road to walk in nor mark to march by. These difficulties, however, Alexander got over; though not without a miraculous interposition, as is pretended by all his historians.

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Alexander having consulted the oracle, and received a favourable answer, returned to pursue his conquests. Having settled the government of Egypt, he appointed the general rendezvous of his forces at Tyre. Here he met with ambassadors from Athens, requesting him to pardon such of their countrymen as he found serving the enemy. The king, being desirous to oblige such a famous state, granted their request; and sent also a fleet to the coast of Greece, to prevent the effects of some commotions which had lately happened in Peloponnesus. He then directed his march to Thapsacus; and having passed the Euphrates and Tigris, met with Darius near Arbela, where the Persians were again overthrown with prodigious slaughter †, and Alexander in effect became master of the Persian empire.

† See *Arbela.*

83 Reduces Babylon, Susa, and Persepolis.

After this important victory, Alexander marched directly to Babylon, which was immediately delivered up; the inhabitants being greatly disaffected to the Persian interest. After 30 days stay in this country, the king marched to Susa, which had already surrendered to Philoxenus; and here he received the treasures of the Persian monarch, amounting, according to the most generally received account, to 50,000 talents. Having received also at this time a supply of 6000 foot and 500 horse from Macedon, he set about reducing the nations of Media, among whom Darius was retired. He first reduced the Uxians, and having forced a passage to Persepolis the capital of the empire, he like a barbarian destroyed the stately palace there, a pile of building not to be equalled in any part of the world; after having given up the city to be plundered by his soldiers. In the palace he found 120,000 talents, which he appropriated to his own use, and caused immediately to be carried away upon mules and camels; for he had such an extreme aversion to the inhabitants of Persepolis, that he determined to leave nothing valuable in the city.

During the time that Alexander remained at Persepolis, he received intelligence that Darius remained at Ecbatana the capital of Media; upon which he pursued him with the greatest expedition, marching at the rate of near 40 miles a-day. In 15 days he reached Ecbatana, where he was informed that Darius had retired from thence five days before, with an intent to pass into the remotest provinces of his empire. This put some stop to the rapid progress of the Macedonian army; and the king, perceiving that there was no necessity for hurrying himself and his soldiers in such a manner, began to give the orders requisite in the present situation of his affairs. The Thessalian

84 He pursues Darius;

horse,

Macedon. horse, who had deserved exceedingly well of him in all his battles, he dismissed according to his agreement; gave them their whole pay, and ordered 2000 talents over and above to be distributed among them. He then declared that he would force no man: but if any were willing to serve him longer for pay, he desired they would enter their names in a book, which a great many of them did; the rest sold their horses, and prepared for their departure. The king appointed Epocillus to conduct them to the sea, and assigned him a body of horse as an escort: he likewise sent Menetes with them, to take care of their embarkation, and that they were safely landed in Eubœa without any expence to themselves.

On receiving fresh information concerning the state of Darius's affairs, the king set out again in pursuit of him, advancing as far as Rhages, a city one day's journey from the Caspian straits: there he understood that Darius had passed those straits some time before; which information leaving him again without hopes, he halted for five days. Oxidates, a Persian whom Darius had left prisoner at Susa, was made governor of Media, while the king departed on an expedition into Parthia. The Caspian straits he passed immediately without opposition; and then gave directions to his officers to collect a quantity of provisions sufficient to

85 who is murdered. serve his army on a long march through a wasted country. But before his officers could accomplish those commands, the king received intelligence that Darius had been murdered by Bessus, one of his own subjects, and governor of Bactria, as is related at length under the article PERSIA.

86 Alexander reduces Hyrcania. As soon as Alexander had collected his forces together, and settled the government of Parthia, he entered Hyrcania; and having, according to his usual custom, committed the greatest part of his army to the care of Craterus, he, at the head of a choice body of troops, passed through certain craggy roads, and before the arrival of Craterus, who took an open and easy path, struck the whole provinces with such terror, that all the principal places were immediately put into his hands, and soon after the province of Aria also submitted, and the king continued Satibarzanes the governor in his employment.—The reduction of this province finished the conquest of Persia; but the ambition of Alexander to become master of every nation of which he had the least intelligence, induced him to enter the country of the Mardi, merely because its rocks and barrenness had hitherto hindered any body from conquering, or indeed from attempting to conquer it. This conquest, however, he easily accomplished, and obliged the whole nation to submit to his pleasure. But in the mean time disturbances began to arise in Alexander's new empire, and among his troops, which all his activity could not thoroughly suppress. He had scarcely left the province of Aria, when he received intelligence, that the traitor Bessus had caused himself to be proclaimed king of Asia by the name of *Artaxerxes;* and that Satibarzanes had joined him, after having massacred all the Macedonians who had been left in the province. Alexander appointed one *Arsames* governor in the room of Satibarzanes; and marched thence with his army against the *Zarangæ*, who, under the command of Barzaentes, one of those who had conspired against Darius, had taken up arms, and threatened to make an obstinate defence. Macedon. But their numbers daily falling off, Barzaentes being afraid they would purchase their own safety at the expence of his, privately withdrew from his camp, and, crossing the river Indus, sought shelter among the nations beyond it. But they, either dreading the power of Alexander, or detesting the treachery of this Persian towards his former master, seized and delivered him up to Alexander, who caused him immediately to be put to death.

87 The Macedonians give themselves up to luxury. The immense treasure which the Macedonians had acquired in the conquest of Persia began now to corrupt them. The king himself was of a most generous disposition, and liberally bestowed his gifts on those around him; but they made a bad use of his bounty, and foolishly indulged in those vices by which the former possessors of that wealth had lost it. The king did all in his power to discourage the lazy and inactive pride which now began to show itself among his officers; but neither his discourses nor his example had any considerable effect. The manners of his courtiers from bad became worse, in spite of all he could say or do to prevent it; and at last they proceeded to censure his conduct, and to express themselves with some bitterness on the subject of his long continuance of the war, and his leading them constantly from one labour to another. This came to such a height, that the king was at last obliged to use some severity, in order to keep his army within the limits of their duty.

88 Alexander conforms to the Persian customs. From this time forward, however, Alexander himself began to alter his conduct; and by giving a little into the customs of the Orientals, endeavoured to secure that obedience from his new subjects which he found so difficult to be preserved among his old ones. He likewise endeavoured, by various methods, to blend the customs of the Asiatics and the Greeks. The form of his civil government resembled that of the ancient Persian kings; in the military affairs, however, he preserved the Macedonian discipline; but then he made choice of 30,000 boys out of the provinces, whom he caused to be instructed in the Greek language, and directed to be brought up in such a manner as that from time to time he might with them fill up the phalanx. The Macedonians saw with great concern these extraordinary measures, which suited very ill with their gross understandings; for they thought, after all the victories they had gained, to be absolute lords of Asia, and to possess not only the riches of its inhabitants, but to rule the inhabitants themselves: whereas they now saw, that Alexander meant no such thing; but that, on the contrary, he conferred governments, offices at court, and all other marks of confidence and favour, indiscriminately both on Greeks and Persians.—From this time also the king seems to have given instances of a cruelty he had never shown before. Philotas his most intimate friend was seized, tortured, and put to death for a conspiracy of which it could never be proved that he was guilty; and soon after Parmenio and some others were executed without any crime at all real or alleged. These things very much disturbed the army. Some of them wrote home to Macedon of the king's suspicions of his friends, and his disposition to hunt out enemies at the very extremities of the world. Alexander having intercepted some of these letters, and procured

Macedon. procured the best information he could concerning their authors, picked out these dissatisfied people, and having disposed them into a corps, gave it the title of the *turbulent battalion;* hoping by this means to prevent the spirit of disaffection from pervading the whole army.

As a farther precaution against any future conspiracy, Alexander thought fit to appoint Hephæstion and Clytus generals of the auxiliary horse; being apprehensive, that if this authority was lodged in the hands of a single person, it might prompt him to dangerous undertakings, and at the same time furnish him with the means of carrying them into execution. To keep his forces in action, he suddenly marched into the country of the Euergetæ, i. e. *Benefactors;* and found them full of that kind and hospitable disposition for which that name had been bestowed on their ancestors: he therefore treated them with great respect; and at his departure added some lands to their dominions, which lay contiguous, and which for that reason they had requested of him.

Turning then to the east, he entered Arachosia, the inhabitants of which submitted without giving him any trouble. While he passed the winter in these parts, the king received advice, that the Arians, whom he had so lately subdued, were again up in arms, Satibarzanes being returned into that country with two thousand horse assigned him by Bessus. Alexander instantly despatched Artabazus the Persian, with Erigyus and Caranus, two of his commanders, with a considerable body of horse and foot; he likewise ordered Phrataphernes, to whom he had given the government of Parthia, to accompany them. A general engagement ensued, wherein the Arians behaved very well, as long as their commander Satibarzanes lived; but he engaging Erigyus, the Macedonian struck him first into the throat, and then, drawing forth his spear again, through the mouth; so that he immediately expired, and with him the courage of his soldiers, who instantly began to fly; whereupon Alexander's commanders made an easy conquest of the rest of the country, and settled it effectually under his obedience.

89 Satibarzanes defeated and killed.

The king, notwithstanding the inclemency of the season, advanced into the country of Paropamisus, so called from the mountain Paropamisus, which the soldiers of Alexander called *Caucasus*. Having crossed the country in 16 days, he came at length to an opening leading into Media; which finding of a sufficient breath, he directed a city to be built there, which he called *Alexandria*, as also several other towns about a day's journey distant from thence: and in these places he left 7000 persons, part of them such as had hitherto followed his camp, and part of the mercenary soldiers, who, weary of continual fatigue, were content to dwell there. Having thus settled things in this province, sacrificed solemnly to the gods, and appointed Proexes the Persian president thereof, with a small body of troops under the command of Niloxenus to assist him, he resumed his former design of penetrating into Bactria.

90 Bessus reduced and put to death.

Bessus, who had assumed the title of *Artaxerxes*, when he was assured that Alexander was marching towards him, immediately began to waste all the country between Paropamisus and the river Oxus; which river he passed with all his forces, and then burnt all the vessels he had made use of for transporting them, retiring to Nautaca, a city of Sogdia; fully persuaded, that, by the precautions he had taken, Alexander would be compelled to give over his pursuit. This conduct of his, however, dishcartened his troops, and gave the lie to all his pretensions; for he had affected to censure Darius's conduct, and had charged him with cowardice, in not defending the rivers Euphrates and Tigris, whereas he now quitted the banks of the most defensible river perhaps in the whole world. As to his hopes, though it cannot be said they were ill founded, yet they proved absolutely vain; for Alexander, continuing his march, notwithstanding all the hardships his soldiers sustained, reduced all Bactria under his obedience, particularly the capital Bactria and the strong castle Aornus: in the latter he placed a garrison under the command of Archelaus; but the government of the province he committed to Artabazus. He then continued his march to the river Oxus: on the banks of which, when he arrived, he found it three quarters of a mile over, its depth more than proportionable to its breadth, its bottom sandy, its stream so rapid as to render it almost unnavigable, and neither boat nor tree in its neighbourhood; so that the ablest commanders in the Macedonian army were of opinion that they should be obliged to march back. The king, however, having first sent away, under a proper escort, all his infirm and worn-out soldiers, that they might be conducted safe to the sea-ports, and from thence to Greece, devised a method of passing this river without either boat or bridge, by causing the hides which covered the soldiers tents and carriages to be stuffed with straw, and then tied together, and thrown into the river. Having crossed the Oxus, he marched directly towards the camp of Bessus, where, when he arrived, he found it abandoned; but received at the same time letters from Spitamenes and Dataphernes, who were the chief commanders under Bessus, signifying, that, if he would send a small party to receive Bessus, they would deliver him into his hands; which they did accordingly, and the traitor was put to death in the manner related in the history of PERSIA.

Macedon.

A supply of horses being now arrived, the Macedonian cavalry were remounted. Alexander continued his march to Maracanda the capital of Sogdia, from whence he advanced to the river Iaxartes. Here he performed great exploits against the Scythians; from whom, however, though he overcame them, his army suffered much; and the revolted Sogdians being headed by Spitamenes, gave him a great deal of trouble. Here he married Roxana the daughter of Oxyartes, a prince of the country whom he had subdued. But during these expeditions, the king greatly disgusted his army by the murder of his friend Clytus in a drunken quarrel at a banquet, and by his extravagant vanity in claiming divine honours.

91 Alexander marries Roxana.

At last he arrived at the river Indus, where Hephæstion and Perdiccas had already provided a bridge of boats for the passage of the army. The king refreshed his troops for 30 days in the countries on the other side of the river, which were those of his friend and ally Taxiles, who gave him 30 elephants, and joined his army now with 700 Indian horse, to which, when they were to enter upon action, he afterwards added 5000 foot,

92 Passes the Indus.

Macedon. foot. The true reason of this seems to have been his enmity to Porus, a famous Indian prince whose territories lay on the other side of the river Hydaspes. During this recess, the king sacrificed with great solemnity; receiving also ambassadors from Ambisurus, a very potent prince, and from Doxareas, who was likewise a king in those parts, with tenders of their duty, and considerable presents. These ceremonies over, Alexander appointed Philip governor of Taxila, and put a Macedonian garrison into the place, because he intended to erect an hospital there for the cure of his sick and wounded soldiers. He then ordered the vessels, of which his bridge had been composed when he passed the Indus, to be taken to pieces, that they might be brought to the Hydaspes, where he was informed that Porus with a great army lay encamped to hinder his passage. When he approached the banks of this river with his army and the auxiliaries under the command of Taxiles, he found that the people he had to do with were not so easily to be subdued as the Persians and other Asiatics. The Indians were not only a very tall and robust, but also a very hardy and well disciplined people; and their king Porus was a prince of high spirit, invincible courage, and great conduct.

It was about the summer solstice when Alexander reached the Hydaspes, and consequently its waters were broader, deeper, and more rapid, than at any other time; for in India the rivers swell as the sun's increasing heat melts the snow, and subside again as winter approaches. Alexander therefore had every difficulty to struggle with. Porus had made his dispositions so judiciously, that Alexander found it impossible to practise upon him as he had done upon others, and to pass the river in his view: wherefore he was constrained to divide his army into small parties, and to practice other arts, in order to get the better of so vigilant a prince. To this end he caused a great quantity of corn and other provisions to be brought into his camp; giving out, that he intended to remain where he was till the river fell, and by becoming fordable should give him an opportunity of forcing a passage: this did not, however, hinder Porus from keeping up very strict discipline in his camp; which when Alexander perceived, he frequently made such motions as seemed to indicate a change of his resolution, and that he had still thoughts of passing the river. The main thing the Macedonians stood in fear of were the elephants; for the bank being pretty steep on the other side, and it being the nature of horses to start at the first appearance of those animals, it was foreseen that the army would be disordered, and incapable of sustaining the charge of Porus's troops.

93 And the Hydaspes with difficulty.

At length Alexander passed the river by the following contrivance. There was, at the distance of 150 stadia from his camp, a rocky promontory projecting into the river, thick covered with wood; and over-against this promontory there lay a pretty large uninhabited island almost overgrown with trees. The king therefore conceived within himself a project of conveying a body of troops from this promontory into that island; and upon this scheme he built his hopes of surprising Porus, vigilant as he was. To this end he kept him and his army constantly alarmed for many nights together, till he perceived that Porus apprehended it was only done to harass his troops, and therefore no longer drew out of his camp, but trusted to his ordinary guards: then Alexander resolved to put his design in execution. A considerable body of horse, the Macedonian phalanx, with some corps of light-armed foot, he left in his camp under the command of Craterus, as also the auxiliary Indians, giving these orders, to be observed in his absence, that if Porus marched against him with part of his army, and left another part with the elephants behind in his camp, Craterus and his forces should remain where they were; but if it so happened that Porus withdrew his elephants, then Craterus was to pass the river, because his cavalry might then do it safely. Alexander having marched half the way, or about nine of our miles, ordered the mercenary troops under the command of Attalus and other generals, to remain there; and directed them, that as soon as they knew he was engaged with the Indians on the other side, they should pass in vessels provided for that purpose, in order to assist him. Then marching a long way about, that the enemy might not perceive his design of reaching the rock, he advanced as diligently as he could towards that post. It happened very fortunately for him, that a great storm of thunder, lightning, and hail, rose in the night, whereby his march was perfectly concealed, his vessels of 30 oars put together, and his tents stuffed and stitched, so that they passed from the rock into the island, without being perceived, a little before break of day; the storm ceasing just as he and his soldiers were ready for their passage. When they had traversed the island, they boldly set forward to gain the opposite shore in sight of Porus's outguards, who instantly posted away to give their master an account of the attempt. Alexander landed first himself, and was followed as expeditiously as possible by his forces, whom he took care to draw up as fast as they arrived. When they began their march again, they found that their good fortune was not so great as at first they esteemed it; for it appeared now, that they had not reached the continent at all, but were in truth in another island much larger than the former. They crossed it as fast as they could, and found that it was divided from the *terra firma* by a narrow channel, which, however, was so swelled by the late heavy rain, that the poor soldiers were obliged to wade up to the breast. When they were on the other side, the king drew them up again carefully, ordering the foot to march slowly, they being in number about 6000, while himself with 5000 horse advanced before. As soon as Porus received intelligence that Alexander was actually passing the river, he sent his son with 2000 horse and 120 armed chariots, to oppose him. But they came too late: Alexander was already got on shore, and even on his march.

94 The son of Porus defeated and killed.

When the Macedonian scouts perceived them advance, they informed the king, who sent a detachment to attack them, remaining still at the head of his cavalry in expectation of Porus. But when he found that this party was unsupported, he instantly attacked with all his horse, and defeated them with the slaughter of many, and the loss of all their armed chariots, the son of Porus being slain in the fight. The remainder of the horse returning to the camp with this disastrous account, Porus was in some confusion: however, he took very quickly the best and wisest resolutions his circumstances would allow: which were,

Macedon. to leave a party of his army, with some of his elephants, to oppose Craterus, who was now about to pass the river also; and, with the rest, to march against Alexander and his forces, who were already passed. This resolution once taken, he marched immediately out of his camp at the head of 4000 horse, 30,000 foot, 300 chariots, and 200 elephants. He advanced as expeditiously as he could, till he came into a plain which was firm and sandy, where his chariots and elephants might act to advantage: there he halted, that he might put his army in order, knowing well that he need not go in quest of his enemy. Alexander soon came up with his horse, but he did not charge Porus; on the contrary, he halted, and put his troops in order, that they might be able to defend themselves in case they were attacked. When he had waited some time, his foot arrived; whom he immediately surrounded with his horse, that, after so fatiguing a march, they might have time to cool and breathe themselves, before they were led to engage. Porus permitted all this, because it was not his interest to fight, and because he depended chiefly upon his order of battle, the elephants covering his foot, so that the Macedonians could not charge them.

95 Porus himself defeated.

When Alexander had disposed his foot in proper order, he placed his horse on the wings: and, observing that he was much superior in them to the enemy, and that the cavalry of Porus were easy to be charged, he resolved to let the foot have as little share as possible in the battle. To this end, having given the necessary directions to Cœnus who commanded them, he went himself to the right, and with great fury fell upon the left wing of Porus. The dispute, though short, was very bloody: the cavalry of Porus, though they fought gallantly, were quickly broken; and the foot being by this means uncovered, the Macedonians charged them. But the Indian horse rallying, came up to their relief, yet were again defeated. By this time the archers had wounded many of the elephants, and killed most of their riders, so that they did not prove less troublesome and dangerous to their own side than to the Macedonians; whence a great confusion ensued: and Cœnus, taking this opportunity, fell on with the troops under his command, and entirely defeated the Indian army. Porus himself behaved with the greatest intrepidity, and with the most excellent conduct: he gave his orders and directed every thing, as long as his troops retained their form; and when they were broken, he retired from party to party as they made stands, and continued fighting till every corps of Indians was put to the rout. In the mean time Craterus had passed with the rest of the Macedonian army; and these, falling upon the flying Indians, increased the slaughter of the day excessively, insomuch that 20,000 foot and 3000 horse were killed, all the chariots were hacked to pieces, and the elephants not killed were taken; two of Porus's sons fell here, as also most of his officers of all ranks.

As for Porus, Alexander gave strict directions that no injury might be done to his person: he even sent Taxiles to persuade him to surrender himself, and to assure him that he should be treated with all the kindness and respect imaginable; but Porus, disdaining this advice from the mouth of an old enemy, threw a javelin at him, and had killed him but for the quick turn of his horse. Meroe the Indian, who was also in the service of Alexander, succeeded better: he had been the old acquaintance of Porus; and therefore when he entreated that prince to spare his person, and to submit himself to fortune and a generous victor, Porus followed his advice; and we may truly say, that the condition of this Indian king suffered nothing by the loss of the battle. Alexander immediately gave him his liberty, restored him shortly after to his kingdom, to which he annexed provinces almost equal to it in value. Neither was Alexander a loser by his munificence; for Porus remained his true friend and constant ally. Macedon.

96 He submits to Alexander.

To perpetuate the memory of this victory, Alexander ordered two cities to be erected; one on the field of battle, which he named *Nicæa;* the other on this side the river, which he called *Bucephala*, in honour of his horse Bucephalus, who died here, as Arrian says, of mere old age, being on the verge of 30. All the soldiers who fell in the battle, he buried with great honours; offered solemn sacrifices to the gods, and exhibited pompous shows on the banks of the Hydaspes, where he had forced his passage. He then entered the territories of the Glausæ, in which were 37 good cities, and a multitude of populous villages. All these were delivered up to him without fighting; and as soon as he received them, he presented them to Porus; and having reconciled him to Taxiles, he sent the latter home to his own dominions. About this time ambassadors arrived from some Indian princes with their submissions: and Alexander having conquered the dominions of another Porus, which lay on the Hydraotes, a branch of the Indus, added them to those of Porus his ally.

In the middle of all this success, however, news arrived, that the Cathei, Oxydracæ, and the Malli, the most warlike nations of India, were confederated against the Macedonians, and had drawn together a great army. The king immediately marched to give them battle; and in a few days reached a city called *Sangala*, seated on the top of a hill, and having a fine lake behind it. Before this city the confederate Indians lay encamped, having three circular lines of carriages locked together, and their tents pitched in the centre. Notwithstanding the apparent difficulty of forcing these intrenchments, Alexander resolved immediately to attack them. The Indians made a noble defence; but at last the first line of their carriages was broken, and the Macedonians entered. The second was stronger by far; yet Alexander attacked that too, and after a desperate resistance forced it. The Indians, without trusting to the third, retired into the city; which Alexander would have invested: but the foot he had with him not being sufficient for that purpose, he caused his works to be carried on both sides as far as the lake; and, on the other side of that, ordered several brigades of horse to take post; ordering also battering engines to be brought up, and in some places employing miners. The second night, he received intelligence that the besieged, knowing the lake to be fordable, intended to make their escape through it. Upon this the king ordered all the carriages which had been taken in forcing their camp to be placed up and down the roads, in hopes of hindering their flight; giving directions to Ptolemy, who commanded

97 Sangala taken.

Macedon. commanded the horse on the other side of the lake, to be extremely vigilant, and to cause all his trumpets to sound, that the forces might repair to that post where the Indians made their greatest effort. These precautions had all the effect that could be desired: for of the few Indians who got through the lake, and passed the Macedonian horse, the greater part were killed on the roads; but the greatest part of their army was constrained to retire again through the water into the city. Two days after, the place was taken by storm. Seventeen thousand Indians were killed; 70,000 taken prisoners; with 300 chariots, and 500 horse. The Macedonians are said to have lost only 100 men in this siege; but they had 1200 wounded, and among these several persons of great distinction.

The city was no sooner taken, than Alexander despatched Eumenes his secretary, with a party of horse, to acquaint the inhabitants of the cities adjacent with what had befallen the Sangalans; promising also, that they should be kindly treated if they would submit. But they were so much affrighted at what had happened to their neighbours, that, abandoning all their cities, they fled into the mountains; choosing rather to expose themselves to wild beasts, than to these invaders, who had treated their countrymen so cruelly. When the king was informed of this, he sent detachments of horse and foot to scour the roads; and these, finding aged, infirm, and wounded people, to the number of about 500, put them to the sword without mercy. Perceiv-

98 And razed. ing that it was impossible to persuade the inhabitants to return, he caused the city of Sangala to be razed, and gave the territories to the few Indians who had submitted to him.

Alexander, still unsated with conquest, now prepared to pass the Hyphasis. The chief reason which induced him to think of this expedition was, the information he had received of the state of the countries beyond that river. He was told that they were in themselves rich and fruitful; that their inhabitants were not only a very martial people, but very civilized; that they were governed by the nobility, who were themselves subject to the laws; and that as they lived in happiness and freedom, it was likely they would fight obstinately in defence of those blessings. He was farther told, that among these nations there were the largest, strongest, and most useful elephants bred and tamed; and was therefore fired with an earnest desire to reduce such a bold and brave people under his rule, and of attaining to the possession of the many valuable things that were said to be amongst them. As exorbitant, however, as his personal ambition was, he found it impossible to infuse any part of it into the minds of his soldiers; who were so far from wishing to triumph over new and remote countries, that they were highly desirous of leaving those that they had already conquered. When therefore they were informed of the king's intentions, they privately consulted together in the camp about the situation of their own affairs. At this consultation, the gravest and best of the soldiers lamented that they were made use of by their king, not as lions, who fall fiercely upon those who have injured them; but as mastiffs who fly upon and tear those who are pointed out to them as enemies. The rest were not so modest; but expressed themselves roundly against the king's humour for leading them from battle to battle, from siege to siege, and from river to river; protesting that they would follow him no further, nor lavish away their lives any longer, to purchase fame for him. Macedon.

99 Alexander's troops refuse to proceed farther.

Alexander was a man of too much penetration not to be early in perceiving that his troops were very uneasy. He therefore harangued them from his tribunal; but though his eloquence was great, and the love his army had for him was yet very strong, they did not relent. For some time the soldiers remained sullen and silent; and at last turned their eyes on Cœnus, an old and experienced general, whom Alexander loved, and in whom the army put great confidence.—He had the generosity to undertake their cause; and told Alexander frankly, "That men endured toil in hopes of rēpose; that the Macedonians were already much reduced in their numbers; that of those who remained, the greater part were invalids; and that they expected, in consideration of their former services, that he would now lead them back to their native country: an act which, of all others, would most contribute to his own great designs; since it would encourage the youth of Macedon, and even of all Greece, to follow him in whatever new expedition he pleased to undertake." The king was far from being pleased with this speech of Cœnus, and much less with the disposition of his army, which continued in a deep silence. He therefore dismissed the assembly: but next day he called another, wherein he told the soldiers plainly, that he would not be driven from his purpose; that he would proceed in his conquests with such as should follow him voluntarily; as for the rest, he would not detain them, but would leave them at liberty to go home to Macedon, where they might publish, "that they had left their king in the midst of his enemies." Even this expedient had no success; his army was so thoroughly tired with long marches and desperate battles, that they were determined to go no further, either for fair speeches or foul. Upon this Alexander retired to his tent, where he refused to see his friends, and put on the same gloomy temper that reigned among his troops. For three days things remained in this situation. At last the king suddenly appeared; and, as if he had been fully determined to pursue his first design, he gave orders for sacrificing for the good success of his new undertaking. Aristander the augur reported, that the omens were altogether inauspicious; upon which the king said, that since his proceeding farther was neither pleasing to the gods, nor grateful to his army, he would return. When this was rumoured among the army, they assembled in great numbers about the royal tent, saluting the king with loud acclamations, wishing him success in all his future designs; giving him at the same time hearty thanks, for that "he who was invincible had suffered himself to be overcome by their prayers."

100 He consents to return.

A stop being thus put to the conquests of Alexander, he determined to make the Hyphasis the boundary of his dominions; and having erected twelve altars of an extraordinary magnitude, he sacrificed on them: after which he exhibited shows in the Grecian manner; and, having added all the conquered country in these parts to the dominions of Porus, he

Macedon.

began to return. Having arrived at the Hydaspes, he made the necessary preparations for sailing down the Indus into the ocean. For this purpose, he ordered vast quantities of timber to be felled in the neighbourhood of the Hydaspes, through which he was to sail into the Indus; he caused the vessels with which he had passed other rivers to be brought thither, and assembled a vast number of artificers capable of repairing and equipping his fleet; which, when finished, consisted of 80 vessels of three banks of oars, and 2000 lesser ships and transports. Those who were to manage this fleet were collected out from the Phœnicians, Cyprians, Carians, and Egyptians following his army, and who were reckoned perfectly well skilled in the naval art. When all things were ready, the army embarked about break of day; the king, in the mean time, sacrificed to the gods according to the ceremonies used in his own country, and likewise according to those of the country where he now was. Then he himself went on board; and causing the signal to be given by sound of trumpet, the fleet set sail. Craterus and Hephæstion had marched some days before with another division of the army; and in three days the fleet reached that part of the river which was opposite to their camps. Here he had information, that the Oxydracæ and Malli were raising forces to oppose him; upon which he immediately determined to reduce them; for, during this voyage, he made it a rule to compel the inhabitants on both sides of the river to yield him obedience. But before he arrived on the coasts of the people above mentioned, he himself sustained no small danger; for, coming to the confluence of the Acesines with the Hydaspes, from whence both rivers roll together into the Indus, the eddies, whirlpools, and rapid currents, rushing with tremendous noise from the respective channels of those rivers into the great one formed by them both, at once terrified those who navigated his vessels, and actually destroyed many of the long vessels, with all who were aboard of them; the king himself being in some danger, and Nearchus the admiral not a little at a loss. As soon as this danger was over, Alexander went on shore; and having ordered his elephants with some troops of horse and archers to be carried across, and put under the command of Craterus, he then divided his army on the left-hand bank into three bodies; the first commanded by himself, the second by Hephæstion, and the third by Ptolemy. Hephæstion had orders to move silently through the heart of the country, five days march before the king; that if, on Alexander's approach, any of the barbarians should attempt to shelter themselves by retiring into the country, they might fall into the hands of Hephæstion. Ptolemy Lagus was ordered to march three days journey behind the king, that if any escaped his army, they might fall into Ptolemy's hands; and the fleet had orders to stop at the confluence of this river with the Hydraotes till such time as these several corps should arrive.

101 Sails down the Indus.

102 His expedition against the Malli.

Alexander himself, at the head of a body of horse and light armed foot, marched through a desert country against the Malli; and, scarce affording any rest to his soldiers, arrived in three days at a city into which the barbarians had put their wives and children, with a good garrison for their defence. The country people, having no notion that Alexander would march through such a desert and barren region, were all unarmed, and in the utmost confusion. Many of them therefore were slain in the field; the rest fled into the city, and shut the gates. But this only protracted their fate for a short time; for the king, having ordered the city to be invested by his cavalry, took it, as well as the castle, by storm, and put all he found there to the sword. He sent at the same time Perdiccas with a considerable detachment, to invest another city of the Malli at a considerable distance; but when he came there he found it abandoned. However, he pursued the inhabitants, who had but lately left it, and killed great numbers of them on the road. After this the king took several other cities, but not without considerable resistance; for the Indians sometime chose to burn themselves in their houses rather than surrender. At last he marched to their capital city; and finding that abandoned, he proceeded to the river Hydraotes, where he found 50,000 men encamped on the opposite bank, in order to dispute his passage. He did not hesitate, however, to enter the river with a considerable party of horse: and so much were the Indians terrified at his presence, that their whole army retired before him. In a short time they returned and attacked him, being ashamed to fly before such an inconsiderable number; but in the mean time the rest of the Macedonian forces came up, and the Indians were obliged to retire to a city which lay behind them, and which Alexander invested that very night. The next day he stormed the city with such violence, that the inhabitants were compelled to abandon it, and to retire to the castle, where they prepared for an obstinate defence. The king instantly gave orders for scaling the walls, and the soldiers prepared to execute these orders as fast as they could; but the king being impatient, caught hold of a ladder and mounted it first himself, being followed by Leonatus, Peucestas, and Abreas, the latter a man of great valour, and who on that account had double pay allowed him. The king having gained the top of the battlements, cleared them quickly of the defendants, killing some of them with his sword, and pushing others over the walls: but after this was done, he was in more danger than ever; for the Indians galled him with their arrows from the adjacent towers, though they durst not come near enough to engage him. His own battalion of targeteers mounting in haste to second him, broke the ladders; which, as soon as Alexander perceived, he threw himself down into the castle, as did also Peucestas, Leonatus, and Abreas. As soon as the king was on the ground, the Indian general rushed forward to attack him; but Alexander instantly despatched him, as well as several others who followed him. Upon this the rest retired, and contented themselves with throwing darts and stones at him at a distance. Abreas was struck into the head with an arrow, and died on the spot; and, shortly after, another pierced through the king's breastplate into his body. As long as he had spirits, he defended himself valiantly; but, through a vast effusion of blood, losing his senses, he fell upon his shield. Peucestas then covered him with the sacred shield of Pallas on one side, as did Leonatus with his own shield on the other, though they themselves were dreadfully

Macedon.

103 His desperate valour, and danger.

Macedon. dreadfully wounded. In the mean time, however, the soldiers on the outside, eager to save their king, supplied their want of ladders, by driving large iron pins into the walls. By the help of these many of them ascended, and came to the assistance of Alexander and his companions. The Indians were now slaughtered without mercy; but Alexander continued for some time in a very dangerous way: however, he at last recovered his strength, and showed himself again to his army, which filled them with the greatest joy.

104 Is with difficulty saved by his men.

The Malli, being now convinced that nothing but submission could save the remainder of them, sent deputies to Alexander, offering the dominion of their country; as did also the Oxydracæ: and the king having settled every thing in these countries agreeable to his mind, proceeded on his voyage down the river Indus. In this voyage he received the submission of some other Indian princes; and perceiving, that at the point of the island Pattala, the river divided itself into two vast branches, he ordered an haven and convenient docks to be made there for his ships; and when he had carcened his fleet, he sailed down the right-hand branch towards the ocean. In his passage he sustained great difficulties by reason of his want of pilots, and at the mouth of the river very narrowly missed being cast away: yet all this did not hinder him from pursuing his first design, though it does not appear that he had any other motive thereto than the vain desire of boasting that he had entered the ocean beyond the Indus: for, having consecrated certain bulls to Neptune, and thrown them into the sea, performed certain libations of golden cups, and thrown the cups also into the sea, he came back again; having only surveyed two little islands, one at the mouth of the Indus, and one a little farther in the ocean.

105 He proceeds in his voyage down the Indus.

On the king's return to Pattala, he resolved to sail down the other branch of the Indus, that he might see whether it was more safe and commodious for his fleet than that which he had already tried; and for this he had very good reasons. He had resolved to send Nearchus with his fleet by sea, through the Persian gulf up the river Tigris, to meet him and his army in Mesopotamia; but as the possibility of this voyage depended on the ceasing of the Etesian winds, there was a necessity of laying up the fleet till the season should prove favourable. Alexander, therefore, sailing through this branch of the Indus, sought on the sea coast for bays and creeks, where his fleet might anchor in safety; he caused also pits to be sunk, which might be filled with fresh water for the use of his people; and took all imaginable precautions for preserving them in case and safety till the season would allow them to continue their voyage. In this he succeeded to his wish; for he found this branch of the river Indus, at its mouth, spread over the plain country, and forming a kind of lake, wherein a fleet might ride with safety. He therefore appointed Leonatus, and a part of his army, to carry on such works as were necessary: causing them to be relieved by fresh troops as often as there was occasion; then having given his last instructions to Nearchus, he departed with the rest of the army, in order to march back to Babylon.

106 Sets out for Babylon.

Before the king's departure, many of his friends advised him against the route which he intended to take. They told him, that nothing could be more rash or dangerous than this resolution. They acquainted him, that the country through which he was to travel was a wild uncultivated desert; that Semiramis, when she led her soldiers this way out of India, brought home but 20 of them; and that Cyrus, attempting to do the same, returned with only seven. But all this was so far from deterring Alexander, that it more than ever determined him to pursue no other road. As soon, therefore, as he had put things in order, he marched at the head of a sufficient body of troops to reduce the Oritæ, who had never vouchsafed either to make their submission or to court his friendship. Their territories lay on the other side of a river called *Arabis*, which Alexander crossed so speedily, that they had no intelligence of his march; whereupon most of them quitted their country, and fled into the deserts. Their capital he found so well situated, that he resolved to take it out of their hands, and to cause a new and noble city to be founded there, the care of which he committed to Hephæstion. Then he received the deputies of the Oritæ and Gedrosi; and having assured them, that if the people returned to their villages, they should be kindly treated, and having appointed Apollophenes president of the Oritæ, and left a considerable body of troops under Leonatus to secure their obedience, he began his march through Gedrosia. In this march his troops suffered incredible hardships. The road was very uncertain and troublesome, on account of its lying through deep and loose sands, rising in many places into hillocks, which forced the soldiers to climb, at the same time that it sunk under their feet; there were no towns, villages, nor places of refreshment, to be met with; so that, after excessive marches, they were forced to encamp among these dry sands. As to provisions, they hardly met with any during their whole march. The soldiers were therefore obliged to kill their beasts of carriage; and such as were sent to bring some corn from the sea side, were so grievously distressed, that, though it was sealed with the king's signet, they cut open the bags, choosing rather to die a violent death for disobedience than perish by hunger. When the king, however, was informed of this, he freely pardoned the offenders; he was also forced to accept the excuses that were daily made for the loss of mules, horses, &c. which were in truth eaten by the soldiers, and their carriages broken in pieces to avoid further trouble. As for water, their want of it was a great misfortune; and yet their finding it in plenty was sometimes a greater: for, as by the first they perished with thirst, so by the latter they were burst, thrown into dropsies, and rendered incapable of travel. Frequently they met with no water for the whole day together: sometimes they were disappointed of it at night; in which case, if they were able, they marched on; so that it was common with them to travel 30, 40, 50, or even 60 miles without encamping. Numbers through these hardships were obliged to lag in the rear; and of these many were left behind, and perished; for indeed scarce any ever joined the army again. Their miseries, however, they sustained with incredible patience, being encouraged by the example of their king; who, on this occasion, suffered greater hardships than the meanest soldier in his army. At last

Macedon.

107 His dangerous march through Gedrosia.

they

Macedon.

108 He arrives in Caramania.

they arrived at the capital of Gedrosia, where they refreshed themselves, and staid some time: after which they marched into Caramania; which being a very plentiful country, they there made themselves ample amends for the hardships and fatigues they had sustained. Here they were joined first by Craterus with the troops under his command, with a number of elephants: then came Stasanor president of the Arians, and Pharismanes the son of Phrataphernes governor of Parthia. They brought with them camels, horses, and other beasts of burden, in vast numbers; having foreseen, that the king's march through Gedrosia would be attended with the loss of the greatest part, if not of all the cavalry and beasts belonging to his army.

109 Redresses the grievances of his people.

During Alexander's stay in Caramania, he redressed the injuries of his people, who had been grievously oppressed by their governors during his absence. Here also he was joined by his admiral Nearchus, who brought him an account that all under his command were in perfect safety, and in excellent condition; with which the king was mightily pleased, and, after having bestowed on him singular marks of his favour, sent him back to the navy. Alexander next set out for Persia, where great disorders had been committed during his absence. These also he redressed, and caused the governor to be crucified; appointing in his room Peucestas, who saved his life when he fought singly against a whole garrison as above related. The new governor was no sooner invested with his dignity, than he laid aside the Macedonian garb, and put on that of the Medes; being the only one of Alexander's captains, who, by complying with the manners of the people he governed, gained their affection.

While Alexander visited the different parts of Persia, he took a view, among the rest, of the ruins of Persepolis, where he is said to have expressed great sorrow for the destruction he had formerly occasioned. From Persepolis he marched to Susa, where he gave an extraordinary loose to pleasure; resolving to make himself and his followers some amends for the difficulties they had hitherto undergone: purposing at the same time so effectually to unite his new conquered with his hereditary subjects, that the jealousies and fears which had hitherto tormented both, should no longer subsist. With this view he married two wives of the blood royal of Persia; viz. Barsine, or Statira, the daughter of Darius, and Parysatis the daughter of Ochus. Drypetis, another daughter of Darius, he gave to Hephæstion; Amastrine, the daughter of Oxyartes the brother of Darius, married Craterus; and to the rest of his friends, to the number of 80, he gave other women of the greatest quality. All these marriages were celebrated at once, Alexander himself bestowing fortunes upon them; he directed likewise to take account of the number of his officers and soldiers who had married Asiatic wives; and though they appeared to be 10,000, yet he gratified each of them according to his rank. He next resolved to pay the debts of his army, and thereupon issued an edict directing every man to register his name and the sum he owed; with which the soldiers complying slowly, from an apprehension that there was some design against them, Alexander ordered tables heaped with money to be set in all quarters of the camp, and caused every man's debts to be paid on his bare word, without even making any entry of his name: though the whole sum came to 20,000 talents. On such as had distinguished themselves in an extraordinary manner, he bestowed crowns of gold. Peucestas had the first; Leonatus the second; Nearchus the third; Onesicritus the fourth; Hephæstion the fifth; and the rest of his guards had each of them one. After this he made other dispositions for conciliating, as he supposed, the differences among all his subjects. He reviewed the 30,000 youths, whom at his departure for India he had ordered to be taught Greek and the Macedonian discipline; expressing high satisfaction at the fine appearance they made, which rendered them worthy of the appellation he bestowed on them, viz. that of *Epigoni*, i. e. successors. He promoted also, without any distinction of nation, all those who had served him faithfully and valiantly in the Indian war. When all these regulations were made, he gave the command of his heavy-armed troops to Hephæstion, and ordered him to march directly to the banks of the Tigris, while in the mean time a fleet was equipped for carrying the king and the troops he retained with him down to the ocean.

Macedon.

110 Marries other two wives.

111 Pays the debts of his army.

Thus ended the exploits of Alexander; the greatest conqueror that ever the world saw, at least with respect to the rapidity of his conquests. In 12 years time he had brought under his subjection Egypt, Libya, Asia Minor, Syria, Phœnicia, Palestine, Babylonia, Persia, with part of India and Tartary. Still, however, he meditated greater things. He had now got a great taste in maritime affairs; and is said to have meditated a voyage to the coasts of Arabia and Ethiopia, and thence round the whole continent of Africa to the straits of Gibraltar. But of this there is no great certainty: though that he intended to subdue the Carthaginians and Italians, is more than probable. All these designs, however, were frustrated by his death, which happened at Babylon in 323 B. C. He is said to have received several warnings of his approaching fate, and to have been advised to avoid that city; which advice he either despised or could not follow. He died of a fever after eight days illness, without naming any successor; having only given his ring to Perdiccas, and left the kingdom, as he said, *to the most worthy*.

112 He dies at Babylon.

113 His character.

The character of this great prince has been variously represented; but most historians seem to have looked upon him rather as an illustrious madman than one upon whom the epithet of *Great* could be properly bestowed. From a careful observation of his conduct, however, it must appear, that he possessed not only a capacity to plan, but likewise to execute, the greatest enterprises that ever entered into the mind of any of the human race. From whatever cause the notion originated, it is plain that he imagined himself a divine person, and born to subdue the whole world: and extravagant and impracticable as this scheme may appear at present, it cannot at all be looked upon in the same light in the time of Alexander. The Greeks were in his time the most powerful people in the world in respect to their skill in the military art, and the Persians were the most powerful with respect to wealth and numbers. The only other powerful people in the world were the Carthaginians, Gauls, and Italian nations. From a long series of wars which the Carthaginians

Macedon. ginians carried on in Sicily, it appeared that they were by no means capable of contending with the Greeks, even when they had an immense superiority of numbers; much less then could they have sustained an attack from the whole power of Greece and Asia united. The Gauls and Italians were indeed very brave, and of a martial disposition; but they were barbarous, and could not have resisted armies well disciplined and under the command of such a skilful leader as Alexander. Even long after this time, it appeared that the Romans themselves could not have resisted the Greeks; since Regulus, after having defeated the Carthaginians and reduced them to the utmost distress, was totally unable to resist a Carthaginian army commanded by a Greek general, and guided by Greek discipline.

Thus it appears, that the scheme of Alexander cannot by any means be accounted that of a madman, or of one who projects great things without judgment or means to execute them. If we consider from his actions the end which most probably he had in view, could his scheme have been accomplished, we shall find it not only the greatest but the *best* that can possibly be imagined. He did not conquer to destroy, enslave, or oppress; but to civilize and unite the whole world as one nation. No sooner was a province conquered than he took care of it as if it had been part of his paternal inheritance. He allowed not his soldiers to oppress and plunder the Persians, which they were very much inclined to do; on the contrary, by giving into the oriental customs himself, he strove to extinguish that inveterate hatred which had so long subsisted between the two nations. In the Scythian countries which he subdued, he pursued the same excellent plan. His courage and military skill, in which he never was excelled, were displayed, not with a view to rapine or desultory conquest, but to civilize and induce the barbarous inhabitants to employ themselves in a more proper way of life. "Midst the hardships of a military life (says Dr Gillies), obstinate sieges, bloody battles, and dear bought victories, he still respected the rights of mankind, and practised the mild virtues of humanity. The conquered nations enjoyed their ancient laws and privileges; the rigours of despotism were softened; arts and industry encouraged; and the proudest Macedonian governors compelled, by the authority and example of Alexander, to observe the rules of justice towards their meanest subjects. To bridle the fierce inhabitants of the Scythian plains, he founded cities and established colonies on the banks of the Iaxartes and Oxus; and those destructive campaigns usually ascribed to his restless activity, and blind ambition, appeared to the discernment of this extraordinary man not only essential to the security of the conquests which he had already made, but necessary for the more remote and splendid expeditions which he still purposed to undertake, and which he performed with singular boldness and unexampled success." In another place, the same author gives his character in the following words.

"He was of a low stature, and somewhat deformed; but the activity and elevation of his mind animated and ennobled his frame. By a life of continual labour, and by an early and habitual practice of the gymnastic exercises, he had hardened his body against the impressions of cold and heat, hunger and thirst, and prepared his robust constitution for bearing such exertions of strength and activity, as have appeared incredible to the undisciplined softness of modern times. In generosity and in prowess, he rivalled the greatest heroes of antiquity; and in the race of glory, having finally outstripped all competitors, became ambitious to surpass himself. His superior skill in war gave uninterrupted success to his arms; and his natural humanity, enlightened by the philosophy of Greece, taught him to improve his conquests to the best interests of mankind. In his extensive dominions he built or founded not less than 70 cities; the situation of which being chosen with consummate wisdom, tended to facilitate communication, to promote commerce, and to diffuse civility through the greatest nations of the earth. It may be suspected, indeed, that he mistook the extent of human power, when in the course of one reign he undertook to change the face of the world: and that he miscalculated the stubbornness of ignorance and the force of habit, when he attempted to enlighten barbarism, to soften servitude, and to transplant the improvements of Greece into an African and Asiatic soil, where they have never been known to flourish. Yet let not the designs of Alexander be too hastily accused of extravagance. Whoever seriously considers what he actually performed before his 33d year, will be cautious of determining what he might have accomplished had he reached the ordinary term of human life. His resources were peculiar to himself; and such views as well as actions became him as would have become none besides. In the language of a philosophical historian, 'he seems to have been given to the world by a peculiar dispensation of Providence, being a man like to none other of the human kind."

Macedon.

"From the part which his father Philip and himself acted in the affairs of Greece, his history has been transmitted through the impure channels of exaggerated flattery, or malignant envy. The innumerable fictions which disgrace the works of his biographers, are contradicted by the most authentic accounts of his reign, and inconsistent with those public transactions which concurring authorities confirm. In the present work it seemed unnecessary to expatiate on such topics, since it is less the business of history to repeat or even to expose errors than to select and impress useful truths. An author, ambitious of attaining that purpose, can seldom indulge the language of general panegyric. He will acknowledge, that Alexander's actions were not always blameless; but, after the most careful examination, he will affirm, that his faults were few in number, and resulted from his situation rather than from his character.

"From the first years of his reign he experienced the crimes of disaffection and treachery, which multiplied and became more dangerous with the extent of his dominions and the difficulty to govern them. Several of his lieutenants early aspired at independence; others formed conspiracies against the life of their master. The first criminals were treated with a lenity becoming the generous spirit of Alexander: but when Philotas, the son of Parmenio, and even Parmenio himself, afforded reason to suspect their fidelity; when the Macedonian youths, who, according to the institution

Macedon. tution of Philip, guarded the royal pavilion, prepared to murder their sovereign, he found it necessary to depart from his lenient system, and to hold with a firmer hand the reins of government. Elated by unexampled prosperity, and the submissive reverence of vanquished nations, his loftiness disgusted the pride of his European troops, particularly the Macedonian nobles, who had been accustomed to regard themselves rather as his companions than subjects. The pretensions which sound policy taught him to form and to maintain, of being treated with those external honours ever claimed by the monarchs of the East, highly offended the religious prejudices of the Greeks, who deemed it impious to prostrate the body or bend the knee to any mortal sovereign. Yet had he remitted formalities consecrated by the practice of ages, he must insensibly have lost the respect of his Asiatic subjects. With a view to reconcile the discordant principles of the victors and vanquished, he affected an immediate descent from Jupiter Ammon, a claim liberally admitted by the avarice or fears of the Libyan priests; and which, he had reason to expect, could not be very obstinately denied by the credulity of the Greeks and Macedonians; who universally acknowledged that Philip, his reputed father, was remotely descended from the Grecian Jupiter. But the success of this design, which might have entitled him, as a son of Jupiter, to the same obeisance from the Greeks which the barbarians readily paid him as monarch of the East, was counteracted, at first by the secret displeasure, and afterwards by the open indignation, of several of his generals and courtiers. Nor did the conduct of Alexander tend to extricate him from this difficulty. With his friends he maintained that equal intercourse of visits and entertainments which characterized the Macedonian manners; indulged the liberal flow of unguarded conversation; and often exceeded that intemperance in wine which disgraced his age and country."

We shall conclude this character of Alexander with observing, that he had in view, and undoubtedly must have accomplished, the sovereignty of the ocean as well as of the land. The violent resistance made by the Tyrians had shown him the strength of a commercial nation; and it was undoubtedly with a view to enrich his dominions by commerce, that he equipped the fleet on the Indus, and wished to keep up a communication with India by sea as well as by land. "It was chiefly with a view to the former of these objects (says Dr Robertson), that he examined the navigation of the Indus with so much attention. With the same view, on his return to Susa, he in person surveyed the course of the Euphrates and Tigris, and gave directions to remove the cataracts or dams with which the ancient monarchs of Persia, induced by a peculiar precept of their religion, which enjoined them to guard with the utmost care against defiling any of the elements, had constructed near the mouths of these rivers, in order to shut out their subjects from any access to the ocean. By opening the navigation in this manner, he proposed that the valuable commodities of India should be conveyed from the Persian gulf into the interior parts of his Asiatic dominions, while by the Arabian gulf they should be carried to Alexandria, and distributed to the rest of the world.

"Grand and extensive as these schemes were, the precautions employed, and the arrangements made for carrying them into execution, were so various and so proper, that Alexander had good reason to entertain sanguine hopes of their proving successful. At the time when the mutinous spirit of his soldiers obliged him to relinquish his operations in India, he was not 30 years of age complete. At this enterprising period of life, a prince of a spirit so active, persevering, and indefatigable, must have soon found means to resume a favourite measure on which he had been long intent. If he had invaded India a second time, he would not, as formerly, have been obliged to force his way through hostile and unexplored regions, opposed at every step by nations and tribes of barbarians whose names had never reached Greece. All Asia, from the shores of the Ionian sea to the banks of the Hyphasis, would then have been subject to his dominion; and through that immense stretch of country he had established such a chain of cities or fortified stations, that his armies might have continued their march with safety, and have found a regular succession of magazines provided for their subsistence. Nor would it have been difficult for him to bring into the field forces sufficient to have achieved the conquest of a country so populous and extensive as India. Having armed and disciplined his subjects in the east like Europeans, they would have been ambitious to imitate and to equal their instructors; and Alexander might have drawn recruits, not from his scanty domains in Macedonia and Greece, but from the vast regions of Asia, which in every age has covered the earth, and astonished mankind with its numerous armies. When at the head of such a formidable power he had reached the confines of India, he might have entered it under circumstances very different from those in his first expedition. He had secured a firm footing there, partly by means of the garrisons which he left in the three cities which he had built and fortified, and partly by his alliance with Taxiles and Porus. These two Indian princes, won by Alexander's humanity and beneficence, which, as they were virtues seldom displayed in the ancient mode of carrying on war, excited of course a higher degree of admiration and gratitude, had continued steady in their attachment to the Macedonians. Reinforced by their troops, and guided by their information as well as by the experience which he had acquired in his former campaigns, Alexander must have made rapid progress in a country where every invader from his time to the present age has proved successful. Macedon.

"But this and all his other splendid schemes were terminated at once by his untimely death. In consequence of that, however, events took place which illustrate and confirm the justness of the preceding speculations and conjectures, by evidence the most striking and satisfactory. When that great empire, which the superior genius of Alexander had kept united and in subjection, no longer felt his superintending controul, it broke into pieces, and its various provinces were seized by his principal officers, and parcelled out among them. From ambition, emulation, and personal animosity, they soon turned their arms against one another; and as several of the leaders were equally eminent for political abilities and for military skill, the contest was maintained long, and carried on with frequent vicissitudes of fortune. Amidst the various convulsions and

revolutions

Macedon. revolutions which these occasioned, it was found that the measures of Alexander for the preservation of his conquests had been concerted with such sagacity, that upon the final restoration of tranquillity, the Macedonian dominion continued to be established in every part of Asia, and not one province had shaken off the yoke. Even India, the most remote of Alexander's conquests, quietly submitted to Python the son of Agenor, and afterwards to Seleucus, who successively obtained dominion over that part of Asia. Porus and Taxiles, notwithstanding the death of their benefactor, neither declined submission to the authority of the Macedonians, nor made any attempt to recover independence."

With the death of Alexander fell also the glory of the Macedonians; who very soon relapsed into a situation, as bad, or worse, than that in which they had been before the reign of Philip. This was occasioned principally by his not having distinctly named a successor, and having no child of his own come to the years of discretion to whom the kingdom might seem naturally to belong. The ambition and jealousy of his mother Olympias, his queen Roxana, and especially of the great commanders of his army, not only prevented a successor from being ever named, but occasioned the death of every person, whether male or female, who was in the least related to Alexander. To have a just notion of the origin of these disturbances, it is necessary in the first place to understand the situation of the Macedonian affairs at the time of Alexander's death.

114 Causes of the dissolution of his empire.

When Alexander set out for Asia, he left Antipater, as we formerly observed, in Macedon, to prevent any disturbances that might arise either there or in Greece. The Greeks, even during the lifetime of Alexander, bore the superiority which he exercised over them with great impatience; and, though nothing could be more gentle than the government of Antipater, yet he was exceedingly hated, because he obliged them to be quiet. One of the last actions of Alexander's life set all Greece in a flame. He had, by an edict, directed all the cities of Greece to recal their exiles; which edict, when it was published at the Olympic games, created much confusion. Many of the cities were afraid, that, when the exiles returned, they would change the government; most of them doubted their own safety, if the edict took place; and all of them held this peremptory decree to be a total abolition of their liberty. No sooner, therefore, did the news of Alexander's death arrive than they prepared for war.

In Asia the state of things was not much better; not indeed through any inclination of the conquered countries to revolt, but through the dissensions among the commanders.—In the general council which was called soon after the death of Alexander, after much confusion and altercation, it was at last agreed, or rather commanded by the soldiers, that Aridæus, the brother of Alexander, who had always accompanied the king, and had been wont to sacrifice with him, should assume the sovereignty.—This Aridæus was a man of very slender parts and judgment, not naturally, but by the wicked practices of Olympias, who had given him poisonous draughts in his infancy, lest he should stand in the way of her son Alexander or any of his family; and for this, or some other reason, Perdiccas, Ptolemy, and most of the horse officers, resented his promotion to such a degree, that they quitted the assembly, and even the city.

115 Aridæus appointed king.

However, Meleager, at the head of the phalanx vigo- Macedon.
rously supported their first resolution, and threatened loudly to shed the blood of those who affected to rule over their equals, and to assume a kingdom, which noway belonged to them: Aridæus was accordingly arrayed in royal robes, had the arms of Alexander put upon him, and was saluted by the name of *Philip*, to render him more popular. Thus were two parties formed, at the head of whom were Meleager and Perdiccas, both of them pretending vast concern for the public good, yet at bottom desiring nothing more than their own advantage. Perdiccas was a man of high birth, and had a supreme command in the army, was much in favour with Alexander, and one in whom the nobility had put great confidence. Meleager had become formidable by having the phalanx on his side, and having the nominal king entirely in his power; for Aridæus, or Philip, was obliged to comply with whatever he thought proper; and publicly declared, that whatever he did was by the advice of Meleager; so that he made his minister accountable for his own schemes, and noway endangered himself. The Macedonians also, besides their regard for the deceased king, soon began to entertain a personal love for Philip on account of his moderation.

116 A party formed by Meleager, and another by Perdiccas.

It is remarkable, however, that notwithstanding all the favours which Alexander had conferred upon his officers, and the fidelity with which they had served him during his life, only two of them were attached to the interests of his family after his death. These were Antipater, and Eumenes the Cardian, whom he had appointed his secretary. Antipater, as we have already seen, was embroiled with the Greeks, and could not assist the royal family who were in Asia; and Eumenes had not as yet sufficient interest to form a party in their favour. In a short time, however, Perdiccas prevailed against Meleager, and got him murdered; by which means the supreme power for a time fell into his hands. His first step, in consequence of this power, was to distribute the provinces of the empire among the commanders in the following manner, in order to prevent competitors, and to satisfy the ambition of the principal commanders of the army. Aridæus, and the son of Roxana, born after the death of his father, were to enjoy the regal authority. Antipater had the government of the European provinces. Craterus had the title of *protector*. Perdiccas was general of the household troops in the room of Hephæstion. Ptolemy the son of Lagus had Egypt, Libya, and that part of Arabia which borders upon Egypt. Cleomenes, a man of infamous character, whom Alexander had made receiver-general in Egypt, was made Ptolemy's deputy. Leomedon had Syria; Philotas, Cilicia; Python, Media; Eumenes, Cappadocia, Paphlagonia, and all the country bordering on the Euxine sea, as far as Trapezus; but these were not yet conquered, so that he was a governor without a province. Antigonus had Pamphylia, Lycia, and Phrygia Major; Cassander, Caria; Menander, Lydia; Leonatus, Phrygia on the Hellespont.

117 Meleager murdered, and the empire divided.

In the mean time, not only Alexander's will, but Alexander himself, was so much neglected, that his body was allowed to remain seven days before any notice was taken of it, or any orders given for its being embalmed. The only will he left was a short memo-

118 Alexander's body neglected, and his will set aside.

Macedon.

randum of six things he would have done.—1. The building of a fleet of 1000 stout galleys, to be made use of against the Carthaginians and other nations who should oppose the reduction of the sea-coasts of Africa and Spain, with all the adjacent islands as far as Sicily. 2. A large and regular highway was to be made along the coast of Africa, as far as Ceuta and Tangier. 3. Six temples of extraordinary magnificence were to be erected at the expence of 1500 talents each. 4. Castles, arsenals, havens, and yards for building ships, to be settled in proper places throughout his empire. 5. Several new cities were to be built in Europe and Asia; those in Asia to be inhabited by colonies from Europe, and those in Europe to be filled with Asiatics; that, by blending their people and their manners, that hereditary antipathy might be eradicated which had hitherto subsisted between the inhabitants of the different continents. 6. Lastly, He had projected the building of a pyramid, equal in bulk and beauty to the biggest in Egypt, in honour of his father Philip. All these designs, under pretence of their being expensive, were referred to a council of Macedonians, to be held nobody knew when or where.

The government, being now in the hands of Perdiccas and Roxana, grew quickly very cruel and distasteful. Alexander was scarce dead when the queen sent for Statira and Drypetis the two daughters of Darius, one of whom had been married to Alexander and the other to Hephæstion: but as soon as they arrived at Babylon, caused them both to be murdered, that no son of Alexander by any other woman, or of Hephæstion, might give any trouble to her or her son Alexander. Sisygambis, the mother of Darius, no sooner heard that Alexander the Great was dead, than she laid violent hands on herself, being apprehensive of the calamities which were about to ensue.

119 The daughters of Darius put to death by Roxana.

War was first declared in Greece against Antipater in the year 321 B. C. Through the treachery of the Thessalians, that general was defeated, with the army he had under his own command. Leonatus was therefore sent from Asia, with a very considerable army, to his assistance; but both were overthrown with great loss by the confederates, and Leonatus himself was killed. In a short time, however, Craterus arrived in Greece with a great army, the command of which he resigned to Antipater. The army of the confederates amounted to 25,000 foot and 3000 horse; but Antipater commanded no fewer than 40,000 foot, 3000 archers, and 5000 horse. In such an unequal contest, therefore, the Greeks were defeated, and forced to sue for peace; which they did not obtain but on condition of their receiving Macedonian garrisons into several of their cities. At Athens also the democratic government was abrogated; and such a dreadful punishment did this seem to the Athenians, that 22,000 of them left their country, and retired into Macedon.

120 The Greeks revolt, but are subdued.

121 Disturbances in Asia and Thrace.

While these things were doing in Greece, disturbances began also to arise in Asia and in Thrace. The Greek mercenaries, who were dispersed through the inland provinces of Asia, despairing of ever being allowed to return home by fair means, determined to attempt it by force. For this purpose, they assembled to the number of 20,000 foot and 3000 horse; but were all cut off to a man by the Macedonians. In Thrace, Lysimachus was attacked by one Seuthes, a prince of that country, who claimed the dominions of his ancestors, and had raised an army of 20,000 foot and 8000 horse. But though the Macedonian commander was forced to engage this army with no more than 4000 foot and 2000 horses, yet he kept the field of battle, and could not be driven out of the country. Perdiccas, in the mean time, by pretending friendship to the royal family, had gained over Eumenes entirely to his interest; and at last put him in possession of the province of Cappadocia by the defeat of Ariarathes king of that country, whom he afterwards cruelly caused to be crucified. His ambition, however, now began to lead him into difficulties. At the first division of the provinces, Perdiccas, to strengthen his own authority, had proposed to marry Nicæa the daughter of Antipater; and so well was this proposal relished, that her brethren Jollas and Archias conducted her to him, in order to be present at the celebration of the nuptials. But Perdiccas now had other things in view. He had been solicited by Olympias to marry her daughter Cleopatra, the widow of Alexander king of Epirus, and who then resided at Sardis in Lydia. Eumenes promoted this match to the utmost of his power, because he thought it would be for the interest of the royal family; and his persuasions had such an effect on Perdiccas, that he was sent to Sardis to compliment Cleopatra, and to carry presents to her in name of her new lover. In the absence of Eumenes, however, Alcetas, the brother of Perdiccas, persuaded him to marry Nicæa; but, in order to gratify his ambition, he resolved to divorce her immediately after marriage, and marry Cleopatra. By this last marriage, he hoped to have a pretence for altering the government of Macedon: and, as a necessary measure preparative to these, he entered into contrivances for destroying Antigonus. Unfortunately for himself, however, he ruined all his schemes by his own jealousy and precipitate cruelty. Cynane, the daughter of Philip by his second wife, had brought her daughter named *Adda*, and who was afterwards named *Eurydice*, to court, in hopes that King Aridæus might marry her. Against Cynane, Perdiccas, from some political motives, conceived such a grudge, that he caused her to be murdered. This raised a commotion in the army; which frightened Perdiccas to such a degree, that he now promoted the match between Aridæus and Eurydice; to prevent which, he had murdered the mother of the young princess. But, in the mean time, Antigonus, knowing the designs of Perdiccas against himself, fled with his son Demetrius to Greece, there to take shelter under the protection of Antipater and Craterus, whom he informed of the ambition and cruelty of the regent.

Macedon.

122 Ambition and cruelty of Perdiccas.

123 A combination against him.

A civil war was now kindled. Antipater, Craterus, Neoptolemus, and Antigonus, were combined against Perdiccas; and it was the misfortune of the empire in general, that Eumenes, the most able general, as well as the most virtuous of all the commanders, was on the side of Perdiccas, because he believed him to be in the interest of Alexander's family. Ptolemy, in the mean time, remained in quiet possession of Egypt; but without the least intention of owning any person for his superior: however, he also acceded to the league formed against Perdiccas; and thus the only person in the whole empire who consulted the interest of the royal family was Eumenes.

Macedon.

It was now thought proper to bury the body of Alexander, which had been kept for two years, during all which time preparations had been making for it. Aridæus, to whose care it was committed, set out from Babylon for Damascus, in order to carry the king's body to Egypt. This was sore against the will of Perdiccas; for it seems there was a superstitious report, that wherever the body of Alexander was laid, that country should flourish most. Perdiccas, therefore, out of regard to his native soil, would have it conveyed to the royal sepulchres in Macedon; but Aridæus, pleading the late king's express direction, was determined to carry it into Egypt, from thence to be conveyed to the temple of Jupiter Ammon.—The funeral was accordingly conducted with all imaginable magnificence. Ptolemy came to meet the body as far as Syria: but, instead of burying it in the temple of Jupiter Ammon, erected a stately temple for it in the city of Alexandria; and, by the respect he showed for his dead master, induced many of the Macedonian veterans to join him, and who were afterwards of the greatest service to him.

124 Alexander buried in Egypt.

125 Perdiccas killed by his own men.

No sooner was the funeral over, than both the parties above mentioned fell to blows. Perdiccas marched against Ptolemy: but was slain by his own men, who, after the death of their general, submitted to his antagonist: and thus Eumenes was left alone to contend against all the other generals who had served under Alexander. In this contest, however, he would by no means have been overmatched, had his soldiers been attached to him; but as they had been accustomed to serve under those very generals against whom they were now to fight, they were on all occasions ready to betray and desert Eumenes. However he defeated and killed Neoptolemus and Craterus, but then found himself obliged to contend with Antipater and Antigonus. Antipater was now appointed protector of the kings, with sovereign power; and Eumenes was declared a public enemy. A new division of Alexander's empire took place. Egypt, Libya, and the parts adjacent, were given to Ptolemy, because they could not be taken from him. Syria was confirmed to Leomedon. Philoxenus had Cilicia. Mesopotamia and Arbelitus were given to Amphimachus. Babylon was bestowed on Selecucus. Susiana fell to Antigenes, who commanded the Macedonian *Argyraspidæ* or *Silver Shields*, because he was the first who opposed Perdiccas. Peucestas held Persia. Tlepolemus had Caramania. Python had Media as far as the Caspian straits. Stasander had Aria and Drangia; Philip, Parthia; Stasonor, Bactria and Sogdia; Sybirtius, Aracopa; Oxyartes, the father of Roxana, Parapomisis. Another Python had the country between this province and India. Porus and Taxiles held what Alexander had given them, because they would not part with any of their dominions. Cappadocia was assigned to Nicanor. Phrygia Major, Lycaonia, Pamphylia, and Lycia, were given to Antigonus; Caria to Cassander, Lydia to Clytus, Phrygia the Less to Aridæus. Cassander was appointed general of the horse; while the command of the household troops was given to Antigonus, with orders to prosecute the war against Eumenes. Antipater having thus settled every thing as well as he could, returned to Macedon with the two kings, to the great joy of his countrymen, having left his son Cassander to be a check upon Antigonus in Asia.

126 A new division of the empire.

Macedon.

Matters now seemed to wear a better aspect than they had yet done; and, had Eumenes believed that his enemies really consulted the interest of Alexander's family, there is not the least doubt that the war would have been immediately terminated. He saw, however, that the design of Antigonus was only to set up for himself, and therefore he refused to submit. From this time, therefore, the Macedonian empire ceased in Asia: and an account of the transactions of this part of the world fall to be recorded under the article SYRIA. The Macedonian affairs are now entirely confined to the kingdom of Macedon itself, and to Greece.

127 Total destruction of Alexander's family.

Antipater had not long been returned to Macedon, when he died; and the last action of his life completed the ruin of Alexander's family. Out of a view to the public good, he had appointed Polysperchon, the eldest of Alexander's captains at hand, to be *protector* and *governor* of Macedon. This failed not to disgust his son Cassander; who thought he had a natural right to these offices, and of course kindled a new civil war in Macedon. This was indeed highly promoted by his first actions as a governor. He began with attempting to remove all the governors appointed in Greece by Antipater, and to restore democracy wherever it had been abolished. The immediate consequence of this was, that the people refused to obey their magistrates; the governors refused to resign their places, and applied for assistance to Cassander. Polysperchon also had the imprudence to recal Olympias from Epirus, and allow her a share in the administration; which Antipater, and even Alexander himself, had always refused her. The consequence of all this was, that Cassander invaded Greece, where he prevailed against Polysperchon: Olympias returned to Macedon, where she cruelly murdered Aridæus and his wife Eurydice; she herself was put to death by Cassander, who afterwards caused Roxana and her son to be murdered, and Polysperchon being driven into Etolia, first raised to the crown Hercules the son of Alexander by the daughter of Darius, and then by the instigation of Cassander murdered him, by which means the line of Alexander the Great became totally extinct.

128 Various revolutions in the government.

Cassander having thus destroyed all the royal family, assumed the regal title as he had for 16 years before had all the power. He enjoyed the title of *king of Macedon* only three years; after which he died, about 298 B. C. By Thessalonica, the daughter of Philip king of Macedon, he left three sons, Philip, Antipater, and Alexander. Philip succeeded him, but soon after died of a consumption. A contest immediately began between the two brothers, Antipater and Alexander. Antipater seized the kingdom; and to secure himself in it, murdered his mother Thessalonica, if not with his own hand, at least the execrable act was committed in his presence. Alexander invited Pyrrhus king of Epirus, and Demetrius the son of Antigonus, to assist him and revenge the death of his mother. But Pyrrhus being bought off, and a peace concluded between the brothers, Alexander, being afraid of having too many protectors, formed a scheme of getting Demetrius assassinated. Instead of this, however, both he and Antipater were put to death; and

Macedon. Demetrius became king of Macedon fours years after the death of Cassander.

In 287 B. C. Demetrius was driven out by Pyrrhus, who was again driven out by Lysimachus two years after, who was soon after killed by Seleucus Nicanor; and Seleucus, in his turn, was murdered by Ptolemy Ceraunus, who became king of Macedon about 280 B. C. The new king was in a short time cut off, with his whole army, by the Gauls; and Antigonus Gonatus, the son of Demetrius Poliorcetes, became king of Macedon in 278 B. C. He proved successful against the Gauls, but was driven out by Pyrrhus king of Epirus; who, however, soon disobliged his subjects to such a degree, that Antigonus recovered a great part of his kingdom. But in a little time, Pyrrhus being killed at the siege of Argos in Greece, Antigonus was restored to the whole of Macedon; but scarcely was he seated on the throne, when he was driven from it by Alexander the son of Pyrrhus. This new invader was, in his turn, expelled by Demetrius the son of Antigonus; who, though at that time but a boy, had almost made himself master of Epirus. In this enterprise, however, he was disappointed; but by his means Antigonus was restored to his kingdom, which he governed for many years in peace. By a stratagem he made himself master of the city of Corinth, and from that time began to form schemes for the thorough conquest of Greece. The method he took to accomplish this was, to support the petty tyrants of Greece against the free states: which indeed weakened the power of the latter; but involved the whole country in so many calamities, that these transactions could not redound much to the reputation either of his arms or his honour. About 243 B. C. he died, leaving the kingdom to his son, Demetrius II.

129 War with the Romans. Neither Demetrius, nor his successor Antigonus Doson, performed any thing remarkable. In 221 B. C. the kingdom fell to Philip, the last but one of the Macedonian monarchs. To him Hannibal applied for assistance after the battle of Cannæ, which he refused; and the same imprudence which made him refuse this assistance prompted him to embroil himself with the Romans; and at last to conclude a treaty with them, by which he in effect became their subject, being tied up from making peace or war but according to their pleasure. In 179 B. C. he was succeeded by his eldest son Perseus, under whom the war with the Romans was renewed. Even yet the Macedonians were terrible in war; and their phalanx, when properly conducted, seems to have been absolutely invincible by any method of making war known at that time. It consisted of 16,000 men, of whom 1000 marched abreast, and thus was 16 men deep, each of whom carried a kind of pike 23 feet long. The soldiers stood so close, that the pikes of the fifth rank reached their points beyond the front of the battle. The hindermost ranks leaned their pikes on the shoulders of those who went before them, and, locking them fast, pressed briskly against them when they made the charge; so that the first five ranks had the impetus of the whole phalanx, which was the reason why the shock was generally irresistible. The Romans had never encountered such a terrible enemy; and in the first battle, which happened 171 B. C. they were defeated with the loss of 2200 men, while the Macedonians lost no more than 60. The generals of Perseus now pressed him to storm the enemy's camp: but he being naturally of a cowardly disposition, refused to comply, and thus the best opportunity he ever had was lost. Still, however, the Romans gained little or no advantage, till the year 168 B. C. when Paulus Æmilius, a most experienced commander, was sent to Macedon. Perseus now put all upon the issue of a general engagement; and Æmilius, with all his courage and military experience, would have been defeated, had the Macedonians been commanded by a general of the smallest courage or conduct. The light-armed Macedonians charged with such vigour, that after the battle, some of their bodies were found within two furlongs of the Roman camp. When the phalanx came to charge, the points of their spears striking into the Roman shields, kept the heavy-armed troops from making any motion; while, on the other hand, Persens's light-armed men did terrible execution. On this occasion, it is said, that Æmilius tore his clothes, and gave up all hopes. However, perceiving that as the phalanx gained ground it lost its order in several places, he caused his own light-armed troops to charge in those places, whereby the Macedonians were soon put into confusion. If Perseus with his horse had on the first appearance of this charged the Romans briskly, his infantry would have been able to recover themselves; but instead of this, he betook himself to flight, and the infantry at last did the same, but not till 20,000 of them had lost their lives.

Macedon || Macer.

This battle decided the fate of Macedon, which immediately submitted to the conqueror. The cowardly king took refuge in the island of Samothrace: but was at last obliged to surrender to the Roman consul, by whom he was carried to Rome, led in triumph, and afterwards most barbarously used. Some pretenders to the throne appeared afterwards; but being unable to defend themselves against the Romans, the country was reduced to a Roman province in 148 B. C. To them it continued subject till the year 1357, when it was reduced by the Turkish sultan Bajazet, and has remained in the hands of the Turks ever since.

130 Macedonia becomes a Roman province.

MACEDONIANS, in ecclesiastical history, the followers of Macedonius, bishop of Constantinople, who through the influence of the Eunomians, was deposed by the council of Constantinople in 360, and sent into exile. He considered the Holy Ghost as a divine energy diffused throughout the universe, and not as a person distinct from the Father and the Son. The sect of Macedonians was crushed before it had arrived at its full maturity, by the council assembled by Theodosius in 381, at Constantinople. See SEMIARIANS.

MACEDONIUS. See MACEDONIANS.

MACER, EMILIUS, an ancient Latin poet, was born at Verona, and flourished under Augustus Cæsar. Eusebius relates, that he died a few years after Virgil. Ovid speaks of a poem of his, on the nature and quality of birds, serpents, and herbs; which he says Macer being then very old had often read to him:

Sæpe suas volucres legit mihi grandior ævo,
Quæque nocet serpens, quæ juvat herba, Macer.
De Ponto, lib. iv. eleg. 10.

There is extant a poem upon the nature and power of herbs under Macer's name; but it is spurious. He also wrote

Macer || Machiavel.

wrote a supplement to Homer, as Quintus Calaber did afterwards in Greek:

Tu canis æterno quicquid restabat Homero:
Ne careant summa Troica bella manu.
De Ponto, lib. ii. eleg. 10.

MACERATION, is an infusion of, or soaking ingredients in water or any other fluid, in order either to soften them or draw out their virtues.

MACERATA, a town of Italy, in the territory of the church, and in the Marche of Ancona, with a bishop's see, an university, and about 10,000 inhabitants. It is situated near the mountain Chiento, in E. Long. 13. 37. N. Lat. 43. 15.

MACHAON, a celebrated physician among the ancients, son of Æsculapius and brother to Podalirius. He went to the Trojan war with the inhabitants of Trica, Ithome, and Oechalia. According to some, he was king of Messenia. He was physician to the Greeks, and healed the wounds which they received during the Trojan war. Some supposed he was killed before Troy by Eurypylus the son of Telephus. He received divine honours after death, and had a temple in Messenia.

MACHÆRUS, in *Ancient Geography*, a citadel on the other side Jordan, near the mountains of Moab, not far from and to the north of the *Lacus Asphaltites*. It was the south boundary of the Peræa: situated on a mountain encompassed round with deep and broad valleys; built by Alexander king of the Jews; destroyed by Gabinius, in the war with Aristobulus, and rebuilt by Herod, with a cognominal town round it. Here John the Baptist was beheaded (Josephus).

MACHIAN, one of the Molucca islands, in the East Indian ocean, about 20 miles in circumference, populous and fertile, producing cloves and sago; and is in possession of the Dutch, who have three strong forts built on it,

MACHIAVEL, Nicholas, a famous political writer of the 16th century, was born of a distinguished family at Florence. He wrote in his native language with great elegance and politeness, though he understood very little of the Latin tongue; but he was in the service of Marcellus Virgilius, a learned man, who pointed out to him many of the beautiful passages in the ancients, which Machiavel had the art of placing properly in his works. He composed a comedy upon the ancient Greek model: in which he turned into ridicule many of the Florentine ladies, and which was so well received, that Pope Leo X. caused it to be acted at Rome. Machiavel was secretary, and afterwards historiographer, to the republic of Florence. The house of Medicis procured him this last office, together with a handsome salary, in order to pacify his resentment for having suffered the torture upon suspicion of being an accomplice in the conspiracy of the Soderini against that house, when Machiavel bore his sufferings without making any confession. The great encomiums he bestowed upon Brutus and Cassius, both in his conversations and writings, made him strongly suspected of being concerned in another conspiracy against Cardinal Julian de Medicis, who was afterwards pope under the name of *Clement VII.* However, they carried on no proceedings against him; but from that time he turned every thing into ridicule, and gave himself up to irreligion. He died in 1530, of a remedy which he had taken by way of prevention. Of all his writings, that which has made the most noise, and has drawn upon him the most enemies, is a political treatise entitled the *Prince;* which has been translated into several languages. The world is not agreed as to the motives of this work; some thinking he meant to recommend tyrannical maxims; others, that he only delineated them to excite abhorrence. Machiavel also wrote, Reflections on Titus Livius, which are extremely curious; the History of Florence, from the year 1205 to 1494; and a quarto volume of Poems and other pieces. Mr Harrington considers him as a superior genius, and as the most excellent writer on politics and government that ever appeared. See a view of his opinions in First Dissertation, Supplement, p. 32.

Machiavel || Machinery.

MACHINE, (*Machina*), in the general, signifies any thing that serves to augment or to regulate moving powers: Or it is any body destined to produce motion, so as to save either time or force. The word comes from the Greek μηχανη, "machine, invention, art:" And hence, in strictness, a machine is something that consists more in art and invention, than in the strength and solidity of the materials; for which reason it is that inventors of machines are called *ingenieurs* or *engineers*.

Machines are either simple or compound. The simple ones are the seven mechanical powers, viz. lever, balance, pulley, axis and wheel, wedge, screw, and inclined plane. See Mechanics.

From these the compound ones are formed by various combinations, and serve for different purposes. See Mechanics; also Agriculture, Cannon, Centrifugal, Steam, Furnace, Burroughs, Ramsden, &c. &c.

Machines used in war amongst the Greeks were principally these; 1. Κλιμακες, or scaling ladders; 2. The battering ram; 3. The *helepolis;* 4. The χελωνη or tortoise, called by the Romans *testudo;* 5. The χωμα or *agger*, which was faced with stone, and raised higher than the wall; 6. Upon the χωμα were built πυργοι or towers of wood; 7. Γεφυραι, or osier hurdles; 8. *Catapultæ*, or καταπελται, from which they threw arrows with amazing force; and, 9. The λιθοβολοι, πετροβολοι, or αφιδηια, from which stones were cast with great velocity.

The principal warlike machines made use of by the Romans were, the ram, the *lupus* or wolf, the *testudo* or tortoise, the *balista*, the *catapulta*, and the *scorpion*.

MACHINERY, in epic and dramatic poetry, is when the poet introduces the use of machines; or brings some supernatural being upon the stage, in order to solve some difficulty or to perform some exploit out of the reach of human power.

The ancient dramatic poets never made use of machines, unless where there was an absolute necessity for so doing; whence the precept of Horace,

Nec Deus intersit, nisi dignus vindice nodus
Inciderit.

It is quite otherwise with epic poets, who introduce machines in every part of their poems; so that nothing is done without the intervention of the gods. In Milton's Paradise Lost, by far the greater part of the ac-

tion

Machinery || Mackenzie.

tors are supernatural personages: Homer and Virgil do nothing without them; and, in Voltaire's Henriade, the poet has made excellent use of St Louis.

As to the manner in which these machines should act, it is sometimes invisibly, by simple inspirations and suggestions; sometimes by actually appearing under some human form; and, lastly, by means of dreams and oracles, which partake of the other two. However, all these should be managed in such a manner as to keep within the bounds of probability.

Plate CCXCVIII.

MACHUL, an instrument of music among the Hebrews. Kircher apprehends that the name was given to two kinds of instruments, one of the stringed and the other of the pulsatile kind. That of the former sort had six chords; though there is great reason to doubt whether an instrument requiring the aid of the hair-bow, and so much resembling the violin, be so ancient. The second kind was of a circular form, made of metal, and either hung round with little bells, or furnished with iron rings suspended on a rod or bar that passed across the circle. Kircher supposes that it was moved to and fro by a handle fixed to it, and thus emitted a melancholy kind of murmur.

MACHYNLETH, a town of Montgomeryshire in North Wales, 198 miles from London, and 32 from Montgomery. It is an ancient town, and has a market on Mondays, and several fairs. In 1811 it contained 1252 inhabitants. It is seated on the river Douay, over which there is a large stone bridge, which leads into Merionethshire. It was here that Owen Glyndwr exercised the first acts of his royalty in 1402. Here he accepted the crown of Wales, and assembled a parliament; and the house wherein they met is now standing, divided into tenements.

MACKENZIE, Sir George, an able lawyer, a polite scholar, and a celebrated wit, was born at Dundee in the county of Angus in Scotland in 1636, and studied at the universities of Aberdeen and St Andrew's; after which he applied himself to the civil law, travelled into France, and prosecuted his study in that faculty for about three years. At his return to his native country he became an advocate in the city of Edinburgh; and soon gained the character of an eminent pleader. He did not, however, suffer his abilities to be confined entirely to that province. He had a good taste for polite literature; and he gave the public, from time to time, incontestable proofs of an uncommon proficiency therein. He had practised but a few years, when he was promoted to the office of a judge in the criminal court; and, in 1674, was made king's advocate, and one of the lords of the privy council in Scotland. He was also knighted by his majesty. In these stations he met with a great deal of trouble, on account of the rebellions which happened in his time; and his office of advocate requiring him to act with severity, he did not escape being censured, as if in the deaths of some particular persons who were executed he had stretched the laws too far. But there does not seem to have been any just foundation for this clamour against him; and it is generally agreed, that he acquitted himself like an able and upright magistrate. Upon the abrogation of the penal laws by King James II. our advocate, though he had always been remarkable for his loyalty, and even censured for his zeal against traitors and fanatics, thought himself obliged to resign his post; being convinced, that he could not discharge the duties of it in that point with a good conscience. But he was soon after restored, and held his offices till the Revolution; an event which, it seems, he could not bring himself to approve. He had hoped that the prince of Orange would have returned to his own country when matters were adjusted between the king and his subjects; and upon its proving otherwise, he quitted all his employments in Scotland, and retired into England, resolving to spend the remainder of his days in the university of Oxford. He arrived there in September 1689, and prosecuted his studies in the Bodleian library, being admitted a student there by a grace passed in the congregation, June 2. 1690. In the spring following, he went to London, where he fell into a disorder, of which he died in May 1691. His corpse was conveyed by land to Scotland, and interred there with great pomp and solemnity. "The politeness of his learning, and the sprightliness of his wit, were (says the reverend Mr Granger) conspicuous in all his pleadings, and shone in his ordinary conversation." Mr Dryden acknowledges, that he was unacquainted with what he calls the *beautiful turn of words and thoughts in poetry*, till they were explained and exemplified to him in a conversation with that noble wit of Scotland Sir George Mackenzie.—He wrote several pieces of history and antiquities; Institutions of the laws of Scotland; Essays upon various subjects, &c. His works were printed together at Edinburgh in 1716, in 2 vols. folio.

Mackenzie || Maclaurin.

MACKEREL. See Scomber, Ichthyology *Index*.

MACLAURIN, Colin, a most eminent mathematician and philosopher, was the son of a clergyman, and born at Kilmoddan in Scotland in 1698. He was sent to the university of Glasgow in 1709; where he continued five years, and applied himself to study in a most intense manner. His great genius for mathematical learning discovered itself so early as at twelve years of age; when, having accidentally met with an Euclid in a friend's chamber, he became in a few days master of the first six books without any assistance; and it is certain, that in his 16th year he had invented many of the propositions which were afterwards published under the title of *Geometria Organica*. In his 15th year he took the degree of master of arts; on which occasion he composed and publicly defended a thesis, On the power of Gravity, with great applause. After this he quitted the university, and retired to a country-seat of his uncle, who had the care of his education; for his parents had been dead some time. Here he spent two or three years in pursuing his favourite studies; but, in 1717, he offered himself a candidate for the professorship of mathematics in the Marischal college of Aberdeen, and obtained it after a ten days trial with a very able competitor. In 1719, he went to London, where he became acquainted with Dr Hoadley then bishop of Bangor, Dr Clarke, Sir Isaac Newton, and other eminent men; at which time also he was admitted a member of the Royal Society; and in another journey in 1721, he contracted an intimacy with Martin Folkes, Esq. the president of it, which lasted to his death.

In 1722, Lord Polwarth, plenipotentiary of the king of Great Britain at the congress of Cambray, engaged him

Maclaurin. him to go as a tutor and companion to his eldest son, who was then to set out on his travels. After a short stay at Paris, and visiting other towns in France, they fixed in Lorrain; where Maclaurin wrote his piece On the Percussion of Bodies, which gained the prize of the Royal Academy of Sciences for the year 1724. But his pupil dying soon after at Montpelier, he returned immediately to his profession at Aberdeen. He was hardly settled here, when he received an invitation to Edinburgh; the curators of that university being desirous that he should supply the place of Mr James Gregory, whose great age and infirmities had rendered him incapable of teaching. He had some difficulties to encounter, arising from competitors, who had good interest with the patrons of the university, and also from the want of an additional fund for the new professor, which however at length were all surmounted, principally by the means of Sir Isaac Newton. In November 1725, he was introduced into the university. After this, the mathematical classes soon became very numerous, there being generally upwards of 100 young gentlemen attending his lectures every year; who being of different standings and proficiency, he was obliged to divide them into four or five classes, in each of which he employed a full hour every day, from the first of November to the first of June.

He lived a bachelor to the year 1733: but being not less formed for society than for contemplation, he then married Anne, the daughter of Mr Walter Stewart solicitor-general for Scotland. By this lady he had seven children, of whom two sons and three daughters, together with his wife, survived him. In 1734, Berkeley, bishop of Cloyne, published a piece called "The Analyst;" in which he took occasion, from some disputes that had arisen concerning the grounds of the fluxionary method, to explode the method itself, and also to charge mathematicians in general with infidelity in religion. Maclaurin thought himself included in this charge, and began an answer to Berkeley's book: but, as he proceeded, so many discoveries, so many new theories and problems occurred to him, that instead of a vindicatory pamphlet, his work came out, A complete system of fluxions, with their application to the most considerable problems in geometry and natural philosophy. This work was published at Edinburgh in 1742, 2 vols. 4to; and as it cost him infinite pains, so it is the most considerable of all his works, and will do him immortal honour. In the mean time, he was continually obliging the public with some performance or observation of his own; many of which were published in the fifth and sixth volumes of the "Medical Essays" at Edinburgh. Some of them were likewise published in the Philosophical Transactions; as the following: 1. Of the construction and measure of curves, N° 356. 2. A new method of describing all kinds of curves, N° 359. 3. A letter to Martin Folkes, Esq. on equations with impossible roots, May 1726, N° 394. 4. Continuation of the same, March 1729, N° 408. 5. December the 21st, 1732, on the description of curves; with an account of farther improvements, and a paper dated at Nancy, November 27. 1722, N° 439. 6. An account of the treatise of fluxions, January 27. 1742, N° 467. 7. The same continued, March 10. 1742, N° 469. 8. A rule for finding the meridional parts of a spheroid with the same exactness as of a sphere, August 1741, N° 461. 9. Of the basis of the cells wherein the bees deposite their honey; Nov. 3. 1734, N° 471. Maclaurin.

In the midst of these studies, he was always ready to lend his assistance in contriving and promoting any scheme which might contribute to the service of his country. When the earl of Morton set out in 1739 for Orkney and Shetland, to visit his estates there, he desired Mr Maclaurin to assist him in settling the geography of those countries, which is very erroneous in all our maps; to examine their natural history, to survey the coasts, and to take the measure of a degree of the meridian. Maclaurin's family affairs, and other connexions, would not permit him to do this; he drew, however, a memorial of what he thought necessary to be observed, furnished the proper instruments, and recommended Mr Short, the famous optician, as a fit operator for the management of them. He had still another scheme for the improvement of geography and navigation, of a more extensive nature; which was the opening of a passage from Greenland to the South sea by the north pole. That such a passage might be found, he was so fully persuaded, that he has been heard to say, if his situation could admit of such adventures, he would undertake the voyage, even at his own charge. But when schemes for finding it were laid before the parliament in 1744, and himself consulted by several persons of high rank concerning them, before he could finish the memorials he proposed to send, the premium was limited to the discovery of a north-west passage: and he used to regret, that the word west was inserted, because he thought that passage, if at all to be found, must lie not far from the pole.

In 1745, having been very active in fortifying the city of Edinburgh against the rebel army, he was obliged to fly from thence to the north of England; where he was invited by Herring, then archbishop of York, to reside with him during his stay in this country. In this expedition, however, being exposed to cold and hardships, and naturally of a weak and tender constitution, he laid the foundation of an illness which put an end to his life, in June 1746, at the age of 48.

Mr Maclaurin was a very good as well as a very great man, and worthy of love as well as admiration. His peculiar merit as a philosopher was, that all his studies were accommodated to general utility; and we find, in many places of his works, an application even of the most abstruse theories, to the perfecting of mechanical arts. He had resolved, for the same purpose, to compose a course of practical mathematics, and to rescue several useful branches of the science from the bad treatment they often met with in less skilful hands. But all this his death prevented; unless we should reckon, as a part of his intended work, the translation of Dr David Gregory's "Practical Geometry," which he revised, and published with additions, 1745. In his lifetime, however, he had frequent opportunities of serving his friends and his country by his great skill. Whatever difficulty occurred concerning the constructing or perfecting of machines, the working of mines, the improving of manufactures, the conveying of water, or the execution of any other public work, he

Maclaurin. he was at hand to resolve it. He was likewise employed to terminate some disputes of consequence that had arisen at Glasgow concerning the gauging of vessels; and for that purpose presented to the commissioners of excise two elaborate memorials, with their demonstrations, containing rules by which the officers now act. He made also calculations relating to the provision, now established by law, for the children and widows of the Scots clergy, and of the professors in the universities, entitling them to certain annuities and sums, upon the voluntary annual payment of a certain sum by the incumbent. In contriving and adjusting this wise and useful scheme, he bestowed a great deal of labour, and contributed not a little towards bringing it to perfection. It may be said of such a man, that "he lived to some purpose;" which can hardly be said of those, how uncommon soever their abilities and attainments, who spend their whole time in abstract speculations, and produce nothing to the real use and service of their fellow creatures.

Of his works, we have mentioned his *Geometria Organica*, in which he treats of the description of curve lines by continued motion. We need not repeat what has been said concerning his piece which gained the prize of the Royal Academy of Sciences in 1724. In 1740, the academy adjudged him a prize, which did him still more honour, for solving the motion of the tides from the theory of gravity; a question which had been given out the former year, without receiving any solution. He had only ten days to draw this paper up in, and could not find leisure to transcribe a fair copy; so that the Paris edition of it is incorrect. He afterwards revised the whole, and inserted it in his Treatise of Fluxions; as he did also the substance of the former piece. These, with the Treatise of Fluxions, and the pieces printed in the Philosophical Transactions, of which we have given a list, are all the writings which our author lived to publish. Since his death, two volumes more have appeared; his Algebra, and his Account of Sir Isaac Newton's Philosophical Discoveries. His Algebra, though not finished by himself, is yet allowed to be excellent in its kind: containing, in no large volume, a complete elementary treatise of that science, as far as it hath hitherto been carried. His Account of Sir Isaac Newton's Philosophy was occasioned in the following manner: Sir Isaac dying in the beginning of 1728, his nephew, Mr Conduitt, proposed to publish an account of his life, and desired Mr Maclaurin's assistance. The latter, out of gratitude to his great benefactor, chearfully undertook, and soon finished, the history of the progress which philosophy had made before Sir Isaac's time, and this was the first draught of the work in hand; which not going forward, on account of Mr Conduitt's death, was returned to Mr Maclaurin.—To this he afterwards made great additions, and left it in the state in which it now appears. His main design seems to have been, to explain only those parts of Sir Isaac's philosophy which have been, and still are, controverted; and this is supposed to be the reason why his grand discoveries concerning light and colours are but transiently and generally touched upon. For it is known, that ever since the experiments, on which his doctrine of light and colours is founded, have been repeated with due care, this doctrine has not been contested; whereas his accounting for the celestial motions, and the other great appearances of nature, from gravity, is misunderstood, and even ridiculed by some to this day. Maclaurin. Macquer.

MACQUER, PHILIPPE, advocate of the parliament of Paris, where he was born in 1720, being descended from a respectable family. A weakness in his lungs having prevented him from engaging in the laborious exercises of pleading, he dedicated himself to literary pursuits. His works are, 1. *L'Abregé Chronologique de l'Histoire Ecclesiastique*, 3 vols. 8vo, written in the manner of the present Henault's History of France, but not possessed of equal spirit and elegance. 2. *Les Annales Romanes*, 1756, 8vo; another chronological abridgement, and much better supported than the former. Into this work the author has introduced every thing most worthy of notice which has been written by Saint Evremond, Abbé Saint-Real, President Montesquieu, Abbé Mably, &c. concerning the Romans; and, if we except a difference of style, which is easily discernible, it is, in other respects, a very judicious compilation. 3. *Abregé Chronologique de l'Histoire d'Espagne et de Portugal*, 1759, 1765, in 2 vols. 8vo. This book, in point of accuracy, is worthy of the president Henault, by whom it was begun; but it displays no discrimination of character nor depth of research. The author received assistance from M. Lacombe, whose talents for chronological abridgement are well known. The republic of letters sustained a loss by the death of M. Macquer, which happened on the 27th of January 1770, at the age of 50. As to his character, he was industrious, agreeable, modest, and sincere, and an enemy to all foolish vanity and affectation. He had a cold imagination, but a correct taste. He had an eager thirst for knowledge of every kind, and he had neglected no useful branch of study. He had a share in the Dictionary of Arts and Professions, in 2 vols. 8vo, and in the Translation of the Syphilis of Fracastor published by Lacombe.

MACQUER, *Pierre Joseph*, brother to the former, was born at Paris the 9th of October, 1718, and died there February 16. 1784. He was a member of the Academy of Sciences, and professor of pharmacy; and was engaged in the *Journal de Sçavans*, for the articles of medicine and chemistry. With the latter science he was intimately acquainted. He had a share in the *Pharmacopœia Parisiensis*, published in 1758, in 4to. His other works are, 1. *Elemens de Chimie theorique;* Paris, 1749, 1753, 12mo; which have been translated into English and German.—2. *Elemens de Chimie pratique*, 1751, 2 vols. 12mo. These two works were republished together, in 1756, in 3 vols. 12mo. 3. *Plan d'un cours de Chimie experimentale et raisonée.* 1757, 12mo; in the composition of which he was associated with M. Beaumé. 4. *Formulæ Medicamentorum Magistralium*, 1763. 5. *L'Art de la Teinture en Soie*, 1763. 6. *Dictionnaire de Chimie, contenant la Théorie et la Pratique de cet art*, 1766, 2 vols. 8vo; which has been translated into German, with notes; and into English, with notes, by Mr Kier. Macquer has, by his labours and writings, greatly contributed to render useful an art which formerly tended only to ruin the health of the patient by foreign remedies, or to

reduce

Macquer || Macrocephalus.

reduce the professors of it to beggary, while they prosecuted the idle dreams of converting every thing into gold.

MACRIN, SALMON, one of the best Latin poets of the 16th century, was born at Loudun. His true name was *John Salmon;* but he took that of *Macrin*, from his being frequently so called in ridicule by Francis I. on account of his extraordinary leanness. He was preceptor to Claudius of Savoy, count of Tende; and to Honorius the count's brother; and wrote several pieces of poetry in lyric verse, which were so admired, that he was called *the Horace of his time*. He died of old age, at Loudun, in 1555.—*Charles* MACRIN, his son, was not inferior to him as a poet, and surpassed him in his knowledge of the Greek tongue. He was preceptor to Catharine of Navarre, the sister of Henry the Great; and perished in the massacre on St Bartholomew's day in 1572.

MACROBII, a people of Ethiopia, celebrated for their justice, and the innocence of their manners: also a people in the island of Meröe. The Hyperboreans were also called *Macrobii:* they generally lived to their 120th year; and from their longevity they obtained their name (μακρος βιος, *long life.*)

MACROBIUS, AMBROSIUS AURELIUS THEODOSIUS, an ancient Latin writer, who flourished towards the latter part of the fourth century.—Of what country he was, is not clear: Erasmus, in his Ciceronianus, seems to think he was a Greek; and he himself tells us, in the preface to his Saturnalia, that he was not a Roman, but laboured under the inconveniences of writing in a language which was not natural to him. Of what religion he was, Christian or Pagan, is uncertain. Barthius ranks him among the Christians; but Spanheim and Fabricius suppose him to have been a heathen. This, however, is certain, that, he was a man of consular dignity, and one of the chamberlains or masters of the wardrobe to Theodosius; as appears from a rescript directed to Florentius, concerning those who were to obtain that office. He wrote a commentary upon Cicero's *Somnium Scipionis*, and seven books of *Saturnalia*, which treat of various subjects, and are an agreeable mixture of criticism and antiquity. He was not an original writer, but made great use of other people's works, borrowing not only their materials, but even their language, and for this he has been satirically rallied by some modern authors, though rather unfairly, considering the express declaration and apology which he makes on this head, at the very entrance of his work. "Don't blame me," says he, "if what I have collected from multifarious reading, I shall frequently express in the very words of the authors from whom I have taken it: for my view in this present work is, not to give proofs of my eloquence, but to collect and digest into some regularity and order such things as I thought might be useful to be known. I shall therefore here imitate the bees, who suck the best juices from all sorts of flowers, and afterwards work them up into various forms and orders with some mixture of their own proper spirit." The *Somnium Scipionis* and *Saturnalia* have been often printed; to which has been added, in the later editions, a piece entitled *De Differentiis et Societatibus Græci Latinique Verbi.*

MACROCEPHALUS (compounded of μακρος, "great," and κεφαλη, "head," denotes a person with a head larger or longer than the common size. Macrocephali, or Long-heads, is a name given to a certain people, who, according to the accounts of authors, were famous for the unseemly length of their heads: yet custom so far habituated them to it, that instead of looking on it as a deformity, they esteemed it a beauty, and, as soon as the child was born, moulded and fashioned its head in their hands to as great a length as possible, and afterwards used all such rollers and bandages as might seem most likely to determine its growing long. The greater part of the islanders in the Archipelago, some of the people of Asia, and even some of those of Europe, still press their children's heads out lengthwise. We may observe also, that the Epirots, many people of America, &c. are all born with some singularity in the conformation of their heads; either a flatness on the top, two extraordinary protuberances behind, or one on each side; singularities which we can only regard as an effect of an ancient and strange mode, which at length is become hereditary in the nation. According to the report of many travellers, the operation of compressing the head of a child lengthwise, while it is yet soft, is with a view insensibly to enlarge the interval between the two eyes, so that the visual rays turning more to the right and left, the sight would embrace a much larger portion of the horizon; the advantage of which they are well acquainted with, either in the constant exercise of hunting, or on a thousand other occasions. Ever since the 16th century, the missionaries established in the countries inhabited by the savages of America, have endeavoured to destroy this custom; and we find in the sessions of the third council of Lima, held in 1585, a canon which expressly prohibits it. But if it has been repressed one way, the free negroes and Maroons, although Africans, have adopted it, since they have been established among the Caribs, solely with the view of distinguishing their children, which are born free, from those who are born in slavery. The Omaquas, a people of South America, according to P. Veigh, press the heads of their children so violently between two planks that they become quite sharp at the top, and flat before and behind. They say they do this to give their heads a greater resemblance to the moon. Macrocephalus || Macroomp.

MACROCERCI, a name given to that class of animalcules, which have tails longer than their bodies.

MACROCOLUM, or MACROCOLLUM (formed of μακρος, "large, and κολλαω, "I join,") among the Romans, the largest kind of paper then in use. It measured sixteen inches, and frequently two feet.

MACROCOSM, a word denoting the great world or universe. It is compounded of the Greek words μακρος, "great," and κοσμος, "world."

MACROOMP, or MACROOM, a town of Ireland in the barony of Muskerry, county of Cork, and province of Munster, 142 miles from Dublin; it is situated amongst hills, in a dry gravelly limestone soil.—This place is said to take its name from an old crooked oak, so called in Irish, which formerly grew here. The castle was first built in King John's time, soon after the English conquest (according to Sir Richard Cox), by the Carews; but others attribute it to the Daltons. It was repaired and beautified by Teague Macarty, who died in the year 1565, and was father to

Macrocomp || Madagascar.

the celebrated Sir Cormac Mac Teague mentioned by Camden and other writers as an active person in Queen Elizabeth's time. The late earls of Glancarty altered this castle into a more modern structure, it being burnt down in the wars of 1641. Opposite to the bridge is the parish-church, dedicated to St Colman of Cloyne. Here is a barrack for a foot company, a market-house, and a handsome Roman Catholic chapel. A considerable number of persons have been employed in this town in combing wool and spinning yarn, and some salt-works have been erected here. At half a mile's distance is a spaw, that rises on the very brink of a bog; its waters are a mild chalybeate, and are accounted serviceable in hypochondriacal cases, and in cutaneous eruptions. The fairs are four in the year.

MACROURUS, a genus of fishes belonging to the order *Thoracici*. See ICHTHYOLOGY *Index*.

MACTATIO, in the Roman sacrifices, signifies the act of killing the victim. This was performed either by the priest himself, or some of his inferior officers, whom we meet with under the names of *popæ*, *agones*, *cultrarii*, and *victimarii*; but, before the beast was killed, the priest, turning himself to the east, drew a crooked line with his knife, from the forehead to the tail. Among the Greeks, this ceremony was performed most commonly by the priest, or, in his absence, by the most honourable person present. If the sacrifice was offered to the celestial gods, the victim's throat was bent up towards heaven; if to the infernal, or to heroes, it was killed with its throat towards the ground. The manner of killing the animal was by a stroke on the head, and, after it was fallen, thrusting a knife into its throat. Much notice was taken, and good or ill success predicted, from the struggles of the beast, or its quiet submission to the blow, from the flowing of the blood, and the length of time it happened to live after the fall, &c.

MACULÆ, in *Astronomy*, dark spots appearing on the luminous surfaces of the sun and moon, and even some of the planets. See ASTRONOMY *Index*.

MAD-APPLE. See SOLANUM, BOTANY *Index*.

MADAGASCAR, the largest of the African islands, is situated between 43° and 51° of E. Long. and between 12° and 26° of S. Lat.; extending in length near 1000 miles from north-north-east to south-south-west, and about 300 in breadth where broadest. It was discovered in 1506 by Laurence Almeyda; but the Persians and the Arabians were acquainted with it from time immemorial under the name of *Serandib*. Alphonzo Albuquerque ordered Ruy Pereira dy Conthinto to visit the interior parts, and that general intrusted Tristan d'Acunha with the survey. The Portuguese called it the island of *St Lawrence*; the French who visited it in the reign of Henry IV. named it *Isle Dauphine*; its proper name is *Madegasse*. It is now, however, by common consent, called *Madagascar*.

This large island, according to many learned geographers, is the Cerné of Pliny, and the Menuthiasde of Ptolemy. It is everywhere watered by large rivers, streams and rivulets, which have their sources at the foot of that long chain of mountains which runs through the whole extent of the island from east to west. The two highest promontories are called *Vivagora* and *Botistmene*.

These mountains (according to the abbé Rochon*) enclose within their bosoms a variety of precious minerals and useful fossils. The traveller (who for the first time rambles over savage and mountainous countries, intersected with valleys and with hills, where nature left to herself brings forth the most singular and the most varied productions) is involuntarily surprised and terrified at the sight of precipices, the summits of which are crowned with monstrous trees, that seem coeval with the world. His astonishment is redoubled at the noise of those grand cascades, the approach to which is generally inaccessible. But to those views so sublimely picturesque, rural scenes soon succeed; little hills, gently rising grounds, and plains, the vegetation of which is never repressed by the intemperance or the vicissitude of the seasons. The eye contemplates with pleasure those vast savannas which nourish numberless herds of bullocks and of sheep. You behold a flourishing agriculture, produced almost solely by the fertilizing womb of nature. The fortunate inhabitants of Madagascar do not bedew the earth with their sweat; they scarcely stir the ground with a rake, and even that slight preparation is sufficient. They scrape little holes at a small distance from each other, into which they scatter a few grains of rice, and cover them with their feet; and so great is the fertility of the soil, that the lands sown in this careless manner produce a hundred fold.

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The forests present a prodigious variety of the most useful and the most beautiful trees; ebony, wood for dyeing, bamboos of an enormous thickness, and palm trees of every kind. The timber employed in shipbuilding is no less common than those kinds so much prized by the cabinetmaker. We are told by the French governor Flacourt, in his history of this island†, that in the year 1650 he sent to France 52,000 weight of aloes of an excellent quality. All of these various trees and shrubs are surrounded by an infinite number of parasitical plants; mushrooms of an infinite diversity of kinds and colours are to be met with everywhere in the woods: and the inhabitants know well how to distinguish those which are prejudicial to the health. They collect large quantities of useful gums and resins; and out of the milky sap of a tree, denominated by them *finguiore*, a species of jatropha, the inhabitants, by means of coagulation, make that singular substance known to naturalists by the name of *gum elastic*, or Indian rubber.

† *Hist. de l Grand Isl de Madag* Paris 166

Besides the aromatic and medicinal herbs which abound in the forests, the island produces flax and hemp of a length and strength which surpass any in Europe. Sugar-canes, wax, honey of different kinds, tobacco, indigo, white-pepper, gum-lac, ambergris, silk, and cotton, would long since have been objects of commerce which Madagascar would have yielded in profusion, if the Europeans, in visiting the island, had furnished the inhabitants with the necessary information for preparing and improving these several productions.

The sugar-canes (as we are informed by another traveller ‡) are much larger and finer than any in the West Indies; being as thick as a man's wrist, and so full of juice, that a foot of them will weigh two pounds. When the natives travel, they carry a sugar-cane along with them, which will support them for two or three days. Here are also plenty of tamarinds; and such quantities of limes and oranges, that very large casks may

‡ *Ives's Voyage to India*, p. 1

* *Voyage à Madagascar*, &c. Paris 1791.

Madagascar. may be filled with their juices at a trifling expence, as they may be purchased for iron pots, muskets, powder, ball, &c. During the short time that Admiral Watson's squadron staid here in 1754, Mr Ives preserved about half a hogshead full of those juices, which proved afterwards of the greatest service to the ships crews. It must be observed, however, that no good water is to be had at St Augustine in the south-west part of the island, where ships usually touch, unless boats are sent for it four or five miles up the river; and instead of filling their casks at low water (as is the case in most other rivers), they must begin to fill at about a quarter's flood: The reason assigned for this is, that the river has a communication with the sea at other places besides this of St Augustine's bay; and it has been found by experience, that the sea water brought into the river by the flood tide is not discharged till a quarter's flood of the next tide in St Augustine's bay; and for three miles up the river, the water is always very brackish, if not quite salt.

The abundance and variety of provisions of every kind, which a fine climate and fertile soil can produce, are on no part of the globe, according to M. Rochon, superior to those of Madagascar: game, wild-fowl, poultry, fish, cattle, and fruits, are alike plentiful. The oxen, Mr Ives also informs us, are large and fat, and have each a protuberance of fat between the shoulders, weighing about 20 pounds. Their flesh is greatly esteemed by all the European nations trading to India, and ships are sent to Madagascar on purpose to kill and salt them on the island. The protuberance of fat above mentioned is particularly esteemed after it has lain some time in salt; but our author says, that he could not join in the encomiums either on this piece or the beef in general; as the herbage on which the creatures feed gives their flesh a particular taste, which to him was disagreeable. The sheep differ little from the goats; being equally hairy, only that their heads are somewhat larger: their necks resemble that of a calf, and their tails weigh at least ten pounds. Vast quantities of locusts rise here from the low lands in thick clouds, extending sometimes to an incredible length and breadth. The natives eat these insects, and even prefer them to their finest fish. Their method of dressing them is to strip off their legs and wings, and fry them in oil.

The inhabitants (termed *Melagaches* or *Madecasses*), M. Rochon informs us, are in person above the middle size of Europeans. The colour of the skin is different in different tribes: among some it is of a deep black, among others tawney; some of the natives are of a copper colour, but the complexion of by far the greatest number is olive. All those who are black have woolly hair like the negroes of the coast of Africa: those, on the other hand, who resemble Indians and Mulattoes, have hair equally straight with that of the Europeans; the nose is not broad and flat, the forehead is large and open; in short, all the features are regular and agreeable. Their physiognomy displays the appearance of frankness and of satisfaction; they are desirous only of learning such things as may administer to their necessities; that species of knowledge which demands reflection is indifferent to them; sober, agile, active, they spend the greatest part of their time either in sleep or in amusement. In fine, according to the Abbé, the native of Madagascar, like savages in general, possesses a character equally devoid of vice and of virtue; the gratifications of the present moment solely occupy his reflections; he possesses no kind of foresight whatever; and he cannot conceive the idea that there are men in the world who trouble themselves about the evils of futurity. Madagascar.

The population of the island has been estimated at four millions; but this calculation is thought exaggerated by our author, and indeed it appears incredible to us. Every tribe or society inhabits its own canton, and is governed by its own customs. Each of these acknowledges a chief; this chief is sometimes elective, but more usually hereditary. The lands are not divided and portioned out, but belong to those who are at the trouble of cultivating them. These islanders make use of neither locks nor keys; the principal part of their food consists in rice, fish, and flesh; their rice is moistened with a soup which is seasoned with pimento, ginger, saffron, and aromatic herbs. They display wonderful cunning in catching a variety of birds, many of which are unknown in Europe; they have the pheasant, the partridge, the quail, the pintado, the wild duck, teal of five or six different kinds, the blue hen, the black paroquet, and the turtle-dove, in great plenty; and also a bat of a monstrous size, which is much prized on account of its exquisite flavour. These last are so hideous in their appearance, that they at first terrify the Europeans sailors: but after they have vanquished their repugnance to them, they prize their flesh infinitely before that of the pullets of their own country. The Melagaches also catch an immense quantity of sea-fish: such as the dorado, the sole, the herring, the mackarel, the turtle, &c. with oysters, crabs, &c. The rivers afford excellent eels, and mullets of an exquisite flavour.

The inhabitants near St Augustine's bay, Mr Ives informs us, speak as much broken English as enables them to exchange their provisions for European articles. These, on the part of the Melagaches are cattle, poultry, milk, fruit, rice, salt, porcelain, potatoes, yams, fish, lances, and shells. From the Europeans they receive muskets, powder, bullets, flints, *clouties*, (including handkerchiefs, and linen of all kinds), beads, iron pots, &c.—Silver, which they call *manila*, is in great esteem with them, and is made by them into bracelets for their wives.

That part of the island at which the English squadron touched, is in the dominions of the king of *Baba*, who, by the account of Mr Ives, seemed greatly to affect to be an Englishman. They had no sooner touched at the island, than they were waited on by one called *Robin Hood*, and another person, both of whom bore the office of *pursers*. Along with these were *Philibey* the general; John Anderson and Frederic Martin, captains. Nor did the king himself and his family disdain to pay them a visit; who, in like manner, were distinguished by English names; the king's eldest son being called the prince of Wales, and the court not being without a duke of Cumberland, a Prince Augustus, princesses, &c. as in England. All these grandees came on board naked, excepting only a slight covering about their loins and on their shoulders, made of a kind of grass growing on the island; which they had adorned with small glass beads by way of border or fringe. Their hair resembled that of the

Madagascar. Indians in being long and black, rather than the woolly heads of the African negroes. "The wives of the Melagaches (according to our author) take great pains with their husbands hair; sometimes putting it in large and regular curls; at other times braiding it in great order, and making it shine with a particular oil which the island produces. The men always carry in their hands a wooden lance headed with iron, which is commonly made very neat; and they are such excellent marksmen, that they will strike with it a very small object at 30 or 40 yards distance. They have also commonly a musket, which they get from Europeans in exchange for cattle, and are always sure to keep in excellent order. I am sorry to say (continues Mr Ives) that the English are frequently guilty of great impositions in this kind of traffic, by disposing of cheap and ill-tempered barrels among the poor inhabitants, who sometimes lose their lives by the bursting of these pieces. Such iniquitous practises as these must in the end prove injurious to the nation; and has indeed already made the name of more than one-half of these traders truly infamous among the deluded but hitherto friendly Madagascarians.

"They are a civil and good-natured people, but easily provoked, and apt to show their resentment on the least provocation, especially when they think themselves injured or slighted. Another characteristic of them is, the very high notions of dignity they entertain of their king; which is carried to such a height, that they are never more sensibly hurt than when they imagine he is treated with incivility or disrespect. This mighty monarch resides in a town built with mud, about 12 miles up the country from St Augustine's bay. On the east side of the bay, as you enter, there resided one Prince William, a relation and tributary to the king; but who in most cases acted as an independent prince, and always used his utmost endeavours with the officers to cause them buy their provisions from him, and not from the king or his subjects. In this prince's territories, not far from the sea, are the remains of a fort built by Avery the pirate.

"All the women of Madagascar, excepting the very poorest sort, wear a covering over their breasts and shoulders, ornamented with glass beads, and none go without a cloth about their loins. They commonly walk with a long slender rod or stick. The men are allowed to marry as many women as they can support.

"During our stay at this island (says Mr Ives), I observed with great concern, several miserable objects in the last stage of the venereal disease. They had not been able to find any cure; and as far as I could learn, their doctors are totally ignorant of medicine. The only method they use for curing all distempers, as well external as internal, is the wearing on the arm or neck a particular charm or amulet; or besmearing the part affected with earth moistened with the juice of some plant or tree, and made up into soft paste.

"I took some pains to learn their religious tenets; and find that they worship one Universal Father: whom, when they speak in English, they call *God;* and in whom they conceive all kinds of perfection to reside. The sun they look upon as a glorious body; and, I believe, as a spiritual being, but created and dependent. They frequently look up to it with wonder, if not with praise and adoration. They make their supplications to the *One* Almighty, and offer sacrifices to him in their distresses. I had the curiosity to attend a sacrifice, at the hut of John Anderson, whose father had for a long time been afflicted with sickness. About sunset an ox was brought into the yard; and the son, who officiated as a priest, slew it. An altar was reared nigh, and the post of it was sprinkled with the blood of the victim. The head, after its being severed from the body, was placed, with the horns on, at the foot of the altar: the caul was burned on the fire, and most of the pluck and entrails boiled in a pot. The sick man, who was brought to the door, and placed on the ground so as to face the sacrifice, prayed often, and seemingly with great fervency. His eyes were fixed attentively towards the heavens, and his hands held up in a supplicating posture. The ceremony ended with the son's cutting up the ox into small pieces; the greatest part of which he distributed amongst the poor slaves belonging to his father and himself; reserving, however, some of the best pieces for his own use. Upon the whole, I saw so many circumstances in this Madagascarian sacrifice, so exactly resembling those described in the Old Testament as offered up by the Jews, that I could not turn my thoughts back to the original, without being sensibly struck by the exactness of the copy."

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When the squadron first arrived at Madagascar, the king of Baba, a man of about 60 years of age, was ill of the gout. Having demanded of Admiral Watson some presents, the latter complimented him, among other things, with some brandy. The monarch then asked him if he had any doctor with him, and if he was a great doctor, and a king's doctor? To all which being answered in the affirmative, he desired him to bring some *mahomets* (medicines) for his sick knee. With this requisition Mr Ives designed to comply; but having waited until some officers should be ready to accompany him, his majesty in the mean time, took such a dose of brandy as quickly sent the gout into his head, and occasioned his death. Mr Ives observes, that it happened very luckily for him that the monarch's decease happened without his having taken any of the medicines intended for him, as it would have been impossible to avoid the imputation of having poisoned him, which would certainly have been resented by his loyal subjects.

The king's death occasioned great confusion; the grandees being desirous that it should be concealed for some time. This, however, was found impossible; on which they set off for the *Mud Town* about 11 o'clock the same evening. All the inhabitants of the village followed their example; leaving only the dogs, who set up the most hideous howling. Captain Frederic Martin coming to take leave of the English, begged with great earnestness for a fresh supply of gunpowder; whispering that the king was dead, and that they should in all probability go to war about making another. They had been formerly told, that one who had the title of *duke* of Baba would certainly succeed to the throne; but they afterwards learned, that Philibey the general having espoused the cause of *Raphani* the late king's son, and taken him under his tutelage and protection, this youth, who was only about

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16 years of age, succeeded his father as king of Baba.

The following is a description of the southern division of the island, from the Abbé Rochon.

"That part of Madagascar in which Fort-Dauphin is situated is very populous. Almost all the villages are placed on eminences, and surrounded with two rows of strong palisadoes, somewhat in the manner of such of our fences as are composed of hurdles and turf. Within, is a parapet of solid earth about four feet in height; large pointed bamboos placed at the distance of five feet from each other, and sunk in a pit, form a kind of loop-holes, which contribute towards the defence of these villages, some of which are besides fortified with a ditch ten feet in breadth and six in depth. The dwelling of the chief is called a *donac*. When the chiefs go abroad, they are always provided with a musket and a stick armed with iron, and adorned at the extremity with a little tuft of cow's hair. They wear a bonnet of red wool. It is chiefly by the colour of their bonnet that they are distinguished from their subjects. Their authority is extremely limited: however, in the province of *Carcanossi*, the lands by custom belong to their chiefs, who distribute them among their subjects for the purposes of cultivation; they exact a trifling quit-rent in return, which in their language is called *faensa*. The people of Carcanossi are not altogether ignorant of the art of writing; they even possess some historical works in the Madagascar tongue: but their learned men, whom they term *Ombiasses*, make use of the Arabic characters alone. They have treatises on medicine, geomancy, and judicial astrology; the most renowned live in the province of *Matatane;* it is in that district that magic still remains in all its glory; the Matanes are actually dreaded by the other Madecassees on account of their excellence in this delusive art. The Ombiasses have public schools in which they teach geomancy and astrology. The natives have undoubtedly learned the art of writing from the Arabians, who made a conquest of this island about 300 years since.

"The people of the province of *Anossi*, near Fort Dauphin, are lively, gay, sensible, and grateful; they are passionately fond of women; are never melancholy in their company; and their principal occupation is to please the sex; indeed, whenever they meet their wives, they begin to sing and dance. The women, from being happy, are always in good humour. Their lively and cheerful character is extremely pleasing to the Europeans. I have often been present at their assemblies, where affairs of importance have been agitated; I have observed their dances, their sports, and their amusements, and I have found them free from those excesses which are but too common among polished nations. Indeed I was too young at this time for my observations to be of much weight; but if my experience be insufficient to inspire confidence, I beg the reader will rather consider the nature of things, than the relations given by men without principles or intelligence, who fancy that they have a right to tyrannize over the inhabitants of every country which they can subdue. If the people of Madagascar have sometimes availed themselves of treachery, they have been forced to it by the tyranny of the Europeans. The weak have no other arms against the strong. Could they defend themselves by any other means from our artillery and bayonets? They are uninformed and helpless; and we avail ourselves of their weakness, in order to make them submit to our covetousness and caprice. They receive the most cruel and oppressive treatment, in return for the hospitality which they generously bestow on us; and we call them traitors and cowards, when we force them to break the yoke with which we have been pleased to load them."

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In the second volume of Count Benyowsky's Memoirs and Travels we have the following account of the religion, government, &c. of the people of this island.

"The Madgascar nation believe in a Supreme Being, whom they call *Zanhare*, which denotes creator of all things. They honour and revere this Being; but have dedicated no temple to him, and much less have they substituted idols. They make sacrifices, by killing oxen and sheep, and they address all these libations to God. It has been asserted, that this nation likewise makes offerings to the devil: but in this there is a deception; for the piece of the sacrificed beast which is usually thrown into the fire is not intended in honour of the devil, as is usually pretended. This custom is very ancient, and no one can tell the true reason of it. With regard to the immortality of the soul, the Madagascar people are persuaded, that, after their death, their spirit will return again to the region in which the Zanhare dwells; but they by no means admit that the spirit of man, after his death, can suffer any evil. As to the distinction of evil or good, they are persuaded that the good and upright man shall be recompensed, in this life, by a good state of health, the constancy of his friends, the increase of his fortunes, the obedience of his children, and the happiness of beholding the prosperity of his family: and they believe that the wicked man's fate shall be the contrary to this. The Madagascar people, upon this conviction, when they make oaths, add benedictions in favour of those who keep them, and curses against those who break them. In this manner it is that they appeal to the judgment of Zanhare, in making agreements; and it has never been known, or heard of, that a native of Madagascar has broken his oath, provided it was made in the usual manner, which they say was prescribed by their forefathers.

"As to their kings and form of government, &c. the Madagascar people have always acknowledged the line of Ramini, as that to which the rights of Ampansacabe or sovereign belongs. They have considered this line as extinct since the death of Dian Ramini Larizon, which happened 66 years ago, and whose body was buried upon a mountain, out of which the river Manangouron springs; but having acknowledged the heir of this line on the female side, they re-established this title in the year 1776. The right of the Ampansacabe consists in nominating the Rohandrians to assist in the cabars, at which all those who are cited are bound to appear, and the judgment of the Ampansacabe in his cabar is decisive. Another prerogative of the Ampansacabe is, that each Rohandrian is obliged to leave him by will a certain proportion of his property, which the successors usually purchase by a slight tribute or fine. Thirdly, The Ampansacabe has a right to exact from each Rohandrian one-

tenth

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tenth of the produce of his land, and a number of horned cattle and slaves, in proportion to the riches of the country possessed by each Rohandrian. The second order is composed of the Rohandrians, or princes. Since the loss of the Ampansacabe, three of these Rohandrians have assumed the title of *kings*, namely the Rohandrian of the province of Mahavelou, named *Hiavi;* of the province of Voemar, named *Lambouin;* and a third at Bombetoki, named *Cimanoumpou*. The third order consists of the Voadziri, or lords of a district, composed of several villages. The fourth order consists of the Lohavohits, or chiefs of villages. The fifth order, Ondzatzi, who are freemen, compose the attendants or followers of the Rohandrians, Voadziri, or Lohavohits. The sixth order consists of Ombiasses, or learned men; and this order forms the warriors, workmen, physicians, and diviners: these last possess no charge. The seventh order consists of Ampurias or slaves.

"Having made inquiries from Bombetoki passing to the northward, and as far as Itaperc, the result proved that there are 38 Rohandrians actually reigning, and 287 Voadziri. With respect to the Lohavohits, Ondzatzi, and Ombiasses, it was not possible to obtain any accurate determination of their number. These orders preserve a regular gradation, respecting which it would be very difficult to give a detailed account. They live in the manner we read of concerning the ancient patriarchs. Every father of a family is priest and judge in his own house, though he depends upon the Lohavohits, who superintends his conduct. This last is answerable to his Voadziri, and the Voadziri to the Rohandrian.

"The Madagascar people having no communication with the main land of Æthiopia, have not altered their primitive laws; and the language throughout the whole extent of the island is the same. It would be a rash attempt to determine the origin of this nation; it is certain that it consists of three distinct races, who have for ages past formed intermixtures which vary to infinity. The first race is that of Zafe Ibrahim, or descendants of Abraham; but they have no vestige of Judaism, except circumcision, and some names, such as Isaac, Reuben, Jacob, &c. This race is of a brown colour.—The second race is that of Zaferamini: with respect to this, some books which are still extant among the Ombiasses, affirm that it is not more than six centuries since their arrival at Madagascar.—With respect to the third race of Zafe Canambou, it is of Arabian extraction, and arrived much more lately than the others from the coasts of Æthiopia: hence it possesses neither power nor credit, and fills only the charges of writers, historians, poets, &c.

"In regard to arts and trades, the Madagascar nation are contented with such as are necessary to make their moveables, tools, utensils, and arms for defence; to construct their dwellings, and the boats which are necessary for their navigation; and lastly, to fabricate cloths and stuffs for their clothing. They are desirous only of possessing the necessary supplies of immediate utility and convenience. The principal and most respected business, is the manufacture of iron and steel. The artists in this way call themselves *ampanefa vihe*. They are very expert in fusing the ore, and forging utensils, such as hatchets, hammers, anvils, knives, spades, sagayes, razors, pincers, or tweezers for pulling out the hair, &c. The second class consists of the goldsmiths (*ompanefa vola mena*): they cast gold in ingots, and make up bracelets, buckles, earrings, drops, rings, &c. The third are called *ompavillanga*, and are potters. The fourth are the *ompanevata*, or turners in wood, who make boxes called *vatta*, plates, wooden and horn spoons, bee-hives, coffins, &c. The fifth *ompan cacasou*, or carpenters. They are very expert in this business, and make use of the rule, the plane, the compasses, &c. The sixth are the *ompaniavi*, or ropemakers. They make their ropes of different kinds of bark of trees, and likewise of hemp. The seventh, *ampan lamba*, or weavers. This business is performed by women only, and it would be reckoned disgraceful in a man to exercise it. The *ombiasses* are the literary men and physicians, who give advice only. The *herauvitz* are comedians and dancers.

"The Madagascar people always live in society; that is to say, in towns and villages. The towns are surrounded by a ditch and pallisades (as already mentioned), at the extremities of which a guard of from 12 to 20 armed men is kept. The houses of private people consist of a convenient cottage, surrounded by several small ones: the master of the house dwells in the largest, and his women or slaves lodge in the smaller. These houses are built of wood, covered with leaves of the palm tree or straw.

"The houses of the great men of the country are very spacious; each house is composed of two walls and four apartments: round about the principal house other smaller habitations are built for the accommodation of the women, and the whole family of the chief; but the slaves cannot pass the night within them.—Most of the houses inhabited by the Rohandrians are built with taste and admirable symmetry."

The French attempted to conquer and take possession of the whole island, by order, and for the use of, their Most Christian Majesties Louis XIII. and XIV. and they maintained a footing on it from the year 1642 to 1657. During this period, by the most cruel treachery, they taught the native princes the barbarous traffic in slaves, by villanously selling to the Dutch governor of Mauritius a number of innocent people, who had been assisting them in forming a settlement at Fort Dauphin.

The Abbé Rochon tells us, that the insalubrity of the air in Madagascar determined his countrymen in 1664 to quit that immense island, in order to establish themselves at so inconsiderable a place as the isle of Bourbon, which is scarcely perceptible in a map of the globe: but it is apparent, from the account of the state of the French affairs on the island of Madagascar, in 1661, when Flacourt's narrative was published, that their ill treatment of the natives had raised such a general and formidable opposition to their residence in the country, that the French were obliged to abandon their possessions for other reasons than the unhealthy qualities of the climate. We have not room here for a detail of all the oppressive measures of the French, which the abbé himself candidly censures in the strongest terms; but shall extract the following narrative, both because it is interesting in itself, and exhibits the causes and the means of their expulsion.

La

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La Case, one of the French officers employed by the governor of Fort Dauphin against the natives, was so successful in all his enterprises, that they called him *Deaan Pous*, the name of a chief who had formerly conquered the whole island. The French governor, jealous of his renown, treated him harshly, and refused to allow him the rank or honours due to his valour. The sovereign of the province of Amboulle, called *Deaan Rascitat*, taking advantage of his discontent, prevailed on him to become his general. Five Frenchmen followed him. Deaan Nong, the daughter of Rascitat, captivated by the person and heroism of La Case, offered him her hand with the consent of her father. The chief, grown old, infirm, and arrived at the last stage of existence, had the satisfaction of securing the happiness of his subjects, by appointing his son-in-law absolute master of the rich province of Amboulle. La Case, in marrying Deaan Nong, refused to take the titles and honours attached to the sovereign power: he would accept of no other character, than that of the first subject of his wife, who was declared sovereign at the death of her father. Secure in the affection of this princess, who was not only possessed of personal charms, but of courage and great qualities, he was beloved and respected by her family, and by all the people of Amboulle, who reverenced him as a father; and yet, how much soever he wished it, he was unable to contribute to the prosperity of his countrymen at Fort Dauphin, whom he knew to be in the utmost distress. The governor, regarding him as a traitor, had set a price on his head, and on the heads of the five Frenchmen who had followed him. The neighbouring chiefs, irritated at this treatment of a man whom they so much venerated, unanimously refused to supply the fort with provisions. This occasioned a famine in the place, which, with a contagious fever and other maladies, reduced the French garrison to 80 men.

The establishment at Fort Dauphin, on the point of being totally destroyed, was preserved for a short time from ruin by the arrival of a vessel from France, commanded by Kercadio an officer of Brittany, who, with the assistance of a young advocate who had been kidnapped on board the vessel, prevailed on the envious and implacable governor Chamargou to make peace with La Case and his sovereign spouse Deaan Nong. This peace, however, lasted but for a short time; the French, restless and insolent to the neighbouring nations, again drew on them the vengeance of the natives. Even the few friends whom they had been able to acquire by means of La Case, were rendered hostile to them by the tyrannic zeal of the missionaries; who, not contented with being tolerated and allowed to make converts, insisted on Deaan Manang, sovereign of Mandrary, a powerful, courageous, and intelligent chief, well disposed to the French, to divorce all his wives but one. This prince, not convinced of the necessity of such a measure, assured them that he was unable to change his habits and way of living, which were those of his forefathers. "You would allow me (says he) to have one wife; but if the possession of one women is a blessing, why should a numerous seraglio be an evil, while peace and concord reign among those of whom it is composed? Do you see among us any indications of jealousy or hatred? No, all our women are good; all try to make me happy; and I am more their slave than their master." This speech had no effect on Father Stephen, superior of the Madagascar mission. He peremptorily ordered him instantly to repudiate all his wives except one; and threatened, in presence of the women, to have them taken from him by the French soldiers, if he hesitated in complying with his commands. It is easy to imagine, says M. Rochin, with what indignation this language must have been heard in the *donac* or palace of this prince. The females assailed the missionary on all sides; loaded him with execrations and blows; and in their fury, would doubtless have afforded him no more quarter than the Thracian women did Orpheus, if Deaan Manang, notwithstanding his own agitation, had not made use of all his authority to save him.

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In order to free himself from the persecution of this priest, he removed with his family 70 or 80 miles up into the country; but he was soon followed by Father Stephen and another missionary, with their attendants. The chief, Manang, still received them civilly; but he intreated them no longer to insist on the conversion of him and his people, as it was impossible to oblige them to quit the customs and manners of their ancestors. The only reply which Father Stephen made to this intreaty, was by tearing off the *oli*, and the amulets and charms which the chief wore as sacred badges of his own religion; and, throwing them into the fire, he declared war against him and his nation. This violence instantly cost him and his followers their lives: they were all massacred by order of Manang, who vowed the destruction of all the French in the island; in which intention he proceeded in a manner that has been related by an eye witness, who was afterwards provincial commissary of artillery, in a narrative published at Lyons in 1722, entitled *Voyage de Madagascar*. "Our yoke (says the Abbé Rochon) was become odious and insupportable. Historians, for the honour of civilized nations, should bury in oblivion the afflicting narratives of the atrocities exercised on these people, whom we are pleased to call barbarous, treacherous, and deceitful, because they have revolted against European adventurers, whose least crime is that of violating the sacred rites of hospitality."

It was about the year 1672 that the French were totally driven from the island of Madagascar; and no considerable attempts were made to form fresh establishments there till within these few years, by M. de Modave, and by Count Benyowski; neither of which was attended with success, for reasons given by the Abbé, but which we have not room to detail.

MADDER, a plant used in dyeing. See RUBIA, BOTANY *Index*; and for its dyeing properties, see DYEING.

MADEIRAS, a cluster of islands, belonging to Portugal, situated in the Atlantic ocean, in W. Long. 16°, and between 32° and 33° N. Lat.—The largest of them, called *Madeira*, from which the rest take their name, is about 55 English miles long, and 10 miles broad; and was first discovered on the 2d of July, in the year 1419, by Joao Gonzales Zarco, there being no historical foundation for the fabulous report of its discovery by one Machin an Englishman. It is divided into two capitanias, named *Funchal* and *Maxico*, from the towns

Madeiras. of those names. The former contains two judicatures, viz. Funchal and Galhetta; the latter being a town with the title of a county, belonging to the family of Castello-Melhor. The second capitania likewise comprehends two judicatures, viz. Maxico (read Mashico) and San Vicente.

Funchal is the only citadel or city in the island, which has also seven villas or towns; of which there are four, Calhetta, Camara de Lobos, Ribeira Braba, and Ponta de Sol in the capitania of Funchal, which is divided into 26 parishes. The other three are in the capitania of Maxico, which consists of 17 parishes; these towns are called *Maxico*, *San Vicente*, and *Santa Cruz*.

There is one curiosity in the town of Funchal; which deserves to be taken notice of, and that is a chamber in one of the corners of the Franciscan convent, the walls and ceiling of which are completely covered with rows of human skulls and human thigh bones, so arranged that in the obtuse angle made by each pair of the latter, crossing each other obliquely, is placed a skull. The only vacant space that appears is in the centre of the side opposite to the door, on which there is an extraordinary painting above a kind of altar, but what the subject it is intended to represent, it is difficult to determine. A figure probably intended for St Francis, the patron saint, seems to be intent on trying in a balance the comparative weight of a sinner and a saint. A dirty lamp suspended from the ceiling, and just glimmering in the socket, serves dimly to light up this dismal den of skulls. The monk who attends as shewman, is careful to impress on the minds of those who visit it, the idea that they are all relicks of holy men who died on the island, although Mr Barrow is of opinion that the church-yard must have been frequently robbed, in order to accumulate such a prodigious number of skulls, which from a rough computation made by that gentleman, could not be under 3000.

The governor is at the head of all the civil and military departments of this island, of Porto-Santo, the Salvages, and the Ilhas Desertas; which last only contain the temporary huts of some fishermen, who resort thither in pursuit of their business; his salary is computed to be worth 2000l. per annum, 200l. of which is in the form of a present from the English merchants.

The law department is under the corregidor, who is appointed by the king of Portugal, commonly sent from Lisbon, and holds his place during the king's pleasure. All causes come to him from inferior courts by appeal. Each judicature has a senate; and a *Juiz* or judge, whom they choose, presides over them. At Funchal he is called *Juiz da Fora;* and in the absence, or after the death of the corregidor, acts as his deputy. The foreign merchants elect their own judge, called the *Providor*, who is at the same time collector of the king's customs and revenues, which amount in all to about 12,000l. sterling. Far the greatest part of this sum is applied towards the salaries of civil and military officers, the pay of troops, and the maintenance of public buildings. This revenue arises, first from the tenth of all the produce of this island belonging to the king, by virtue of his office as grand master of the order of Christ; secondly, From ten per cent. duties laid on all imports, provisions excepted; and lastly, From the eleven per cent. charged on all exports. Madeiras.

The island has but one company of regular soldiers of 100 men: the rest of the military force is a militia consisting of 3000 men, divided into companies, each commanded by a captain, who has one lieutenant under him and one ensign. There is no pay given to either the private men or the officers of this militia; and yet their places are much sought after, on account of the rank which they communicate. These troops are embodied once a-year, and exercised once a-month. All the military are commanded by the *Serjeante Mor*. The governor has two *Capitanos de Sal* about him, who do duty as aides-de-camp.

The secular priests on the island are about 1200, many of whom are employed as private tutors. Since the expulsion of the Jesuits, no regular public school is to be found here; unless we except a seminary, where a priest, appointed for that purpose, instructs and educates ten students at the king's expence. These wear a red cloak over the usual black gowns worn by ordinary students. All those who intend to go into orders, are obliged to qualify themselves by studying in the university of Coimbra, lately re-established in Portugal. There is also a dean and chapter at Madeira, with a bishop at their head, whose income is considerably greater than the governor's; it consists of 110 pipes of wine, and of 40 muys of wheat, each containing 24 bushels; which amounts in common years to 3000l. sterling. Here are likewise 60 or 70 Franciscan friars, in four monasteries, one of which is at Funchal. About 300 nuns live on the island, in four convents, of the order of Merci, Sta Clara, Incanaçao, and Dom Jesus. Those of the last-mentioned institution may marry whenever they choose, and leave their monastery.

In the year 1768, the inhabitants living in the 43 parishes of Madeira, amounted to 63,913, of whom there were 31,341 males and 32,572 females. But in that year 5243 persons died, and no more than 2198 children were born; so that the number of the dead exceeded that of the born by 3045. It is highly probable that some epidemical distemper carried off so disproportionate a number in that year, as the island would shortly be entirely depopulated if the mortality were always equal to this. Another circumstance concurs to strengthen this supposition, namely, the excellence of the climate. The weather is in general mild and temperate: in summer, the heat is very moderate on the higher parts of the island, whither the better sort of people retire for that season; and in the winter the snow remains there for several days, whilst it is never known to continue above a day or two in the lower parts.

The common people of this island are of a tawney colour, and well shaped; though they have large feet, owing perhaps to the efforts they are obliged to make in climbing the craggy paths of this mountainous country. Their faces are oblong, their eyes dark; their black hair naturally falls in ringlets, and begins to crisp in some individuals, which may perhaps be owing to intermarriages with negroes; in general, they are hard featured, but not disagreeable. Their women are too frequently ill-favoured, and want the florid complexion, which, when united to a pleasing assemblage

Madeiras. blage of regular features, gives our northern fair ones the superiority over all their sex. They are small, have prominent cheek bones, large feet, an ungraceful gait, and the colour of the darkest brunette. The just proportion of the body, the fine form of their hands, and their large lively eyes, seem in some measure to compensate for those defects. The labouring men, in summer, wear linen trowsers, a coarse shirt, a large hat, and boots; some have a short jacket made of cloth, and a long cloak, which they sometimes carry over their arm. The women wear a petticoat, and a short corselet or jacket, closely fitting their shapes, which is a simple, and often not an inelegant dress. They have also a short but wide cloak; and those that are unmarried tie their hair on the crown of their head, on which they wear no covering.

The country people are exceeding sober and frugal; their diet in general consisting of bread and onions, or other roots, and little animal food. However, they avoid eating tripe, or any offals, because it is proverbially said of a very poor man, "He is reduced to eat tripe." Their common drink is water, or an infusion of the remaining rind or skin of the grape (after it has passed through the wine press), which when fermented acquires some tartness and acidity, but cannot be kept very long. The wine for which the island is so famous, and which their own hands prepare, seldom if ever regales them.

Their principal occupation is the planting and raising of vines; but as that branch of agriculture requires little attendance during the greatest part of the year, they naturally incline to idleness. The warmth of the climate, which renders great provision against the inclemencies of weather unnecessary, and the ease with which the cravings of appetite are satisfied, must tend to indolence, wherever the regulations of the legislature do not counteract it, by endeavouring, with the prospect of increasing happiness, to infuse the spirit of industry. It seems the Portuguese government does not pursue the proper methods against this dangerous lethargy of the state. They have lately ordered the plantation of olive trees here, on such spots as are too dry and barren to bear vines; but they have not thought of giving temporary assistance to the labourers, and have offered no premium by which these might be induced to conquer their reluctance to innovations and aversion to labour.

The vineyards are held only on an annual tenure, and the farmer reaps but four-tenths of the produce, since other four-tenths are paid in kind to the owner of the land, one-tenth to the king, and one to the clergy. Such small profits, joined to the thought of toiling merely for the advantage of others, if improvements were attempted, entirely preclude the hopes of a future increase. Oppressed as they are, they have however preserved a high degree of cheerfulness and contentment; their labours are commonly alleviated with songs, and in the evening they assemble from different cottages to dance to the drowsy music of a guitar.

The inhabitants of the towns are more ill-favoured than the country people, and often pale and lean. The men wear French clothes, commonly black, which do not seem to fit them, and have been in fashion in the polite world about half a century ago. Their ladies are delicate and have agreeable features: but the characteristic jealousy of the men still locks them up, and deprives them of a happiness which the country women, amidst all their distresses, enjoy. Many of the better people are a sort of *petite noblesse*, which we would call *gentry*, whose genealogical pride makes them unsociable and ignorant, and causes a ridiculous affectation of gravity. The landed property is in the hands of a few ancient families, who live at Funchal, and in the various towns on the island. Madeira

Madeira consists of one large mountain, whose branches rise everywhere from the sea towards the centre of the island, converging to the summit, in the midst of which is a depression or excavation, called the *Val* by the inhabitants, always covered with a fresh and delicate herbage. This and another cavity of the same description are supposed on good grounds to have been craters of volcanoes. The rocks consist of three or four different species of lava, some of which have assumed a regular prismatic form, some of the prisms being extremely perfect, and of 30 or 40 feet in length. They also contain olivine, and occasionally carbonate of lime and zeolite; and intermixed with the strata of lava are beds of clay, with layers of pumice and ashes. The soil of the island is clay on the surface, and large masses of it as hard as brick are found underneath.

Many brooks and small rivulets descend from the summits in deep chasms or glens, which separate the various parts of the island. The beds of the brooks are in some places covered with stones of all sizes, carried down from the higher parts by the violence of winter rains or floods of melted snow. The water is conducted by wears and channels in the vineyards, where each proprietor has the use of it for a certain time; some being allowed to keep a constant supply of it, some to use it thrice, others twice, and others only once a-week. As the heat of the climate renders this supply of water to the vineyards absolutely necessary, it is not without great expence that a new vineyard can be planted; for the maintenance of which, the owners must purchase water at a high price, from those who are constantly supplied, and are thus enabled to spare some of it.

Wherever a level piece of ground can be contrived in the higher hills, the natives make plantations of eddoes, enclosed by a kind of dyke to cause a stagnation, as that plant succeeds best in swampy ground. Its leaves serve as food for hogs, and the country people use the roots for their own nourishment.

The sweet potato is planted for the same purpose, and makes a principal article of diet; together with chesnuts, which grow in extensive woods, on the higher parts of the island, where the vine will not thrive. Wheat and barley are likewise sown, especially in spots where the vines are decaying through age, or where they are newly planted. But the crops do not produce above three months provisions; and the inhabitants are therefore obliged to have recourse to other food, besides importing considerable quantities of corn from North America in exchange for wine. The want of manure, and the inactivity of the people, are in some measure the causes of this disadvantage; but supposing husbandry to be carried to its perfection

Madeiras. here, they could not raise corn sufficient for their consumption. They make their threshing-floors of a circular form, in a corner of a field, which is cleared and beaten solid for the purpose. The sheaves are laid round about it; and a square board, stuck full of sharp flints below, is dragged over them by a pair of oxen, the driver getting on it to increase its weight. This machine cuts the straw as if it had been chopped, and frees the grain from the husk, from which it is afterwards separated.

The great produce of Madeira is the wine, from which it has acquired fame and support. Where the soil, exposure, and supply of water, will admit of it, the vine is cultivated. One or more walks, about a yard or two wide, intersect each vineyard, and are included by stone walls two feet high. Along these walks which are arched over with laths about seven feet high, they erect wooden pillars at regular distances, to support a lattice-work of bamboos, which slopes down from both sides of the walk, till it is only a foot and a half or two feet high, in which elevation it extends over the whole vineyard. The vines are in this manner supported from the ground, and the people have room to root out the weeds which spring up between them. In the season of the vintage, they creep under this lattice-work, cut off the grapes, and lay them into baskets: some bunches of these grapes weigh six pounds and upwards. This method of keeping the ground clean and moist, and ripening the grapes in the shade, contributes to give the Madeira wines that excellent flavour and body for which they are remarkable. The owners of vineyards are however obliged to allot a certain spot of ground for the growth of bamboos; for the lattice-work cannot be made without them: and it is said some vineyards lie quite neglected for want of this useful reed.

The wines are not all of equal goodness, and consequently of different prices. The best, made of a vine imported from Candia by order of the Infante of Portugal, Don Henry, is called *Madeira Malmsey*, a pipe of which cannot be bought on the spot for less than 40l. or 42l. sterling. It is an exceeding rich sweet wine, and is only made in a small quantity. The next sort is a dry wine, such as is exported for the London market, at 30l. or 31l. sterling the pipe. Inferior sorts for the East India, West India, and North American markets, sell at 28l. 25l. and 20l. sterling. About 40,000 pipes are annually exported, one half of which goes to the British settlements in the East and West Indies. The best vines grow on the south side of the island, and on the side of the hill which points to the east. The inhabitants import Indian corn and wheat from North America, great quantities of salt fish from Newfoundland, and fresh meat and live sheep and oxen from Barbary. The total amount of imports from England in the 17 years ending in 1809, was 3,278,043l. and of exports to England only 216,167l.

The enclosures of the vineyards consist of walls, and hedges of prickly pear, pomegranates, myrtles, brambles, and wild roses. The gardens produce peaches, apricots, quinces, apples, pears, walnuts, chesnuts, and many other European fruits; together with now and then some tropical plants, such as bananas, goavas, and pine-apples.

All the common domestic animals of Europe are likewise found at Madeira; and their mutton and beef, though small, is very well tasted. Their horses are small, but sure-footed; and with great agility climb the difficult paths, which are the only means of communication in the country. They have no wheel-carriages of any kind: but in the town they use a sort of drays or sledges, formed of two pieces of plank joined by cross pieces, which make an acute angle before; these are drawn by oxen, and are used to transport casks of wine, and other heavy goods, to and from the warehouses. Madeiras || Madrid.

The animals of the feathered tribe, which live wild here, are more numerous than the wild quadrupeds; there being only the common gray rabbit here, as a representative of the last-mentioned class. Tame birds, such as turkeys, geese, ducks, and hens, are very rare, which is perhaps owing to the scarcity of corn.

There are no snakes whatsoever in Madeira; but all the houses, vineyards, and gardens, swarm with lizards. The friars of one of the convents complained to Mr Forster, that these vermine destroyed the fruit in their garden; they had therefore placed a brass-kettle in the ground to catch them, as they are constantly running about in quest of food. In this manner they daily caught hundreds, which could not get out on account of the smooth sides of the kettle, but were forced to perish.

The shores of Madeira, and of the neighbouring Salvages and Desertas, are not without fish; but as they are not in plenty enough for the rigid observance of Lent, pickled herrings are brought from Gottenburg in English bottoms, and salted cod from New York and other American ports, to supply the deficiency.

MADIAN, in *Ancient Geography*, a town of Arabia Petræa, near the Arnon; so called from one of the sons of Abraham by Ketura; in ruins in Jerome's time. Jerome mentions another MADIAN, or MIDIAN, beyond Arabia, in the desert, to the south of the Red sea; and hence *Madianæi*, and *Madianitæi*, the people; and *Madianæa Regio*, the country.

MADNESS, a most dreadful kind of delirium, without fever. See MEDICINE *Index*.

MADRAS. See *St* GEORGE.

MADRE DE POPA, a town and convent of South America, in Terra Firma, seated on the river Grande. It is almost as much resorted to by pilgrims of America as Loretto is in Europe; and the image of the Virgin Mary is said to have done many miracles in favour of the seafaring people. W. Long. 76. 0. N. Lat. 11. 0.

MADREPORA, in *Natural History*, the name of a genus of submarine substances; belonging to the order lithophyta. See HELMINTHOLOGY *Index*.

MADRID, a town of New Castile in Spain, and capital of the whole kingdom, though it never had the title of a *city*, is situated in W. Long. 3. 5. N. Lat. 40. 26. It stands in the centre of a large plain, surrounded with mountains, and in the very heart of Spain, on the banks of the little river Manzanares, which is always very low and shallow, except when it is swelled by the melting of the snow on the mountains. The city is in general well laid out; the streets are very handsome; and the houses are fair and lofty, but built of brick, with lattice-windows, excepting those of the rich,

Madrid. rich, who have glass in their windows; only, during the summer heats, they use gauze, or some such thin stuff, instead of it, to let in the fresh air. There are two stately bridges here over the Manzanares, a great many magnificent churches, convents, hospitals, and palaces. The royal palace, which stands on the west side of the town, on an eminence, is spacious and magnificent, consisting of three courts, and commanding a fine prospect. At the east end of the town is the prado, or pardo; which is a delightful plain, planted with regular rows of poplar trees, and watered with a great many fountains; where the nobility and gentry take the air on horseback, or in their coaches, and the common people on foot, or divert themselves with a variety of sports and exercises. Almost all the streets of Madrid are straight, wide, clean, and well paved. The largest and most frequented are the street of Alcala, that of Atocha, that of Toledo, and the *Calle Grande* or great street. Madrid has also several squares, which in general are not very regular. The principal are those of San Joachim, Sol, Lasganitas, San Domingo, La Cevado, and the Plaza Mayor. The latter especially deserves notice for its spaciousness and regularity, and the elegant and lofty houses it contains. It is 1536 feet in circuit. The houses, of which there are 136, are of five stories, ornamented with balconies; the first of which, supported by pillars, forms a piazza round the square, where the inhabitants many walk under cover. In the middle of the square a market is kept.—The streets and squares of Madrid, except the Plaza Mayor which has been just described, are ornamented with fountains in a very ill taste. Those most to be distinguished in this particular are the fountain of the small irregular square called *Plaza di Antonio Martin*, and that of the square named *Puerto del Sol*. The others are not more magnificent, though less ridiculous. The water of all these fountains is excellent; and the air of Madrid, though the weather be variable and uncertain, is extremely pure. This purity of the air and excellent quality of the water which induced Philip II. and his successors to fix their residence in this city, arises from its great height, the plain on which the city stands being more than 2000 feet above the level of the sea. It is also well supplied with provisions of all kinds at reasonable rates; and the court, with the resort and residence of the quality, and the high colleges and offices that are kept here, occasion a brisk trade and circulation of money.

The sacred edifices in this city have nothing remarkable in their architecture; those of St Pasqual, St Isabella, and the Carmelites, contain highly valuable collections of pictures, which may be seen with admiration even after the paintings of the Escurial and the new palace. The church of St Isidro, which heretofore belonged to the Jesuits, has a portal which has escaped the contagion of the age in which it was built. There is another church, much more modern, which on account of its mass has a venerable appearance, but which true taste may justly disavow: it is that of St Salesas, or the Visitation, founded by Ferdinand VI. and the queen Barbara his wife.—Besides a variety of charitable foundations, there are here three confraternities, the revenues of which are appropriated to the succour of the wretched; and an institution similar to the *Mont de Pieté* in Paris, the principal object of which is to advance money to the necessitous. Madrid, Madrigal.

The city of Madrid contains 15 gates, 18 parishes, 35 convents of monks, and 31 of nuns; 39 colleges, hospitals, or houses of charity; 7398 dwelling-houses, and about 168,000 inhabitants. The Lombard traveller Father Caimo, tells us, that 50,000 sheep and 12,000 oxen are annually consumed there; to which his editor has added a ludicrous estimate of the onions and leeks devoured there, which he says amounts to 97000000000000000000000000000045. But this writer (M. Bourgoanne observes) would not at present have any reason to complain of the disagreeable smells of the streets, nor would he find all the perfumes of Arabia necessary to defend himself from them. By the vigilance of the modern police, for which (M. Bourgoanne informs us) it is indebted to the Count d'Aranda, it is rendered one of the cleanest cities in Europe.

There are four academies in Madrid: The first is the Spanish academy, founded in 1714, in imitation of the French academy, and consisting of 24 members, including the president. Its device is a crucible on burning coals, with the motto *lympia, fixa, y da esplender;* "it purifies, fixes, and gives lustre." Its first object was the compilation of a dictionary of the Spanish language, which was published in six volumes folio, and of which a new edition, with great additions, has been lately put to the press. The same academy is also employed on a superb edition of Don Quixotte, adorned with elegant engravings far superior to the last, and collated with all the former editions. The second is the academy of history; which owes its origin to a society of individuals, the object of whose meetings was to preserve and illustrate the historical monuments of the kingdom of Spain. Their labours met the approbation of Philip V. who in 1738 confirmed the statutes by a royal cedula. This academy consists of 24 members, including the president, secretary, and censor. Its device is a river at its source; and the motto, *In patriam populumque fluit.* The other two academies are, the academy of the fine arts, painting, sculpture, and architecture; and the academy of medicine. The latter is held in no great esteem.

The environs of Madrid contain several royal seats; among which are El Buen Retiro, Casa del Campo, Florida, Le Pardo Sarsuela, and St Ildefonso; but the most magnificent, not only in this country but perhaps in the whole world, is the Escurial; which takes its name from a small village near which it stands, about 22 miles north-west from Madrid; and of which a description is given under the article ESCURIAL. Another royal palace, greatly admired, particularly for its delicious gardens and surprising water-works, is Aranjuez, which is situated on the Tagus, about 30 miles south of Madrid. See ARANJUEZ.

MADRIGAL, a short amorous poem, composed of a number of free and unequal verses, neither confined to the regularity of a sonnet, nor to the point of an epigram; but only consisting of some tender and delicate thought, expressed with a beautiful, noble, and elegant simplicity.

Menage derives the word from *mandra*, which in Latin and Greek, signifies "a sheep-fold;" imagining

Madrigal || Mæcenas.

it to have been originally a kind of pastoral or shepherd's song; whence the Italians formed their *madrigale*, and we *madrigal*. Others rather choose to derive it from the word *madrugar*, which in the Spanish language signifies "to rise in the morning;" the *madrigales* being formerly sung early in the morning by those who had a mind to serenade their mistresses.

MADURA, a province of Asia, in the peninsula on this side the Ganges; bounded on the east by Tanjour and Marava, on the south-east by the sea, on the west by the Balagate mountains, which separate it from Malabar, and on the north by Visiapour and Carnate. The inhabitants are Gentoos, and of a thievish disposition. The commodities are rice, elephants teeth, and cotton cloth; of which last a good deal is made here, and very fine. At this place is a pearl fishery, which brings in a large sum annually.

MÆANDER, in *Ancient Geography*, a celebrated river of Asia Minor, rising near Celænæ. It flows through Caria and Ionia into the Ægean sea between Miletus and Priene, after it has been increased by the waters of the Marsyas, Lycus, Eudon, Lethæus, &c. It is celebrated among the poets for its windings, which amount to no less than 600, and from which all obliquities have received the name of *mæanders*. It forms in its course, according to the observation of some travellers, the Greek letters ε ζ ξ ς & ω; and from its windings Dædalus is said to have had the first idea of his famous labyrinth.

MÆATÆ, anciently a people of Britain, near Severus's wall, inhabiting the district now called *Lauderdale*, in Scotland.

MÆCENAS, Caius Cilnius, the great friend and counsellor of Augustus Cæsar, was himself a very polite scholar, but is chiefly memorable for having been the patron and protector of men of letters. He was descended from a most ancient and illustrious origin, even from the kings of Hetruria, as Horace often tells us; but his immediate forefathers were only of the equestrian order. He is supposed to have been born at Rome, because his family lived there; but in what year antiquity does not tell us. It says as little about his education: but we know it must have been of the most liberal kind, and perfectly agreeable to the dignity and splendour of his birth, since he excelled in every thing that related to arms, politics, and letters. How Mæcenas spent his younger years is also unknown to us, any farther than by effects; there being no mention made of him by any writer before the death of Julius Cæsar, which happened in the year of Rome 709. Then Octavius Cæsar, who was afterwards called *Augustus*, went to Rome, to take possession of his uncle's inheritance; and then Mæcenas became first publicly known, though he appears to have been Augustus's intimate friend, and as it should seem guardian, from his childhood. From that time he accompanied him through all his fortunes, and was his counsellor and adviser upon all occasions; so that Pædo Albinovanus justly called him *Cæsaris dextram*, "Cæsar's right-hand."

In A. R. 710, the year that Cicero was killed and Ovid born, Mæcenas distinguished himself by his courage and military skill at the battle of Modena, where the consuls Hirtius and Pansa were slain in fighting against Antony; as he did afterwards at Philippi. After this last battle began the memorable friendship between Mæcenas and Horace. Horace, as Suetonius relates, was a tribune in the army of Brutus and Cassius, and upon the defeat of those generals made a prisoner of war. Mæcenas, finding him an accomplished man, became immediately his friend and protector; and afterwards recommended him to Augustus, who restored him his estate with no small additions. In the mean time, though Mæcenas behaved himself well as a soldier in these and other battles, yet his principal province was that of a minister and counsellor. He was the adviser, the manager, the negociator, in every thing that related to civil affairs. When the league was made at Brundusium between Antony and Augustus, Mæcenas was sent to act on the part of Augustus. This we learn from Horace in his journey to Brundusium: Mæcenas.

Huc venturus erat Mæcenas optimus, atque
Coccius, missi magnis de rebus uterque
Legati, aversos soliti componere amicos. Sat. v. lib. 1.

And afterwards, when this league was near breaking, through the suspicions of each party, Mæcenas was sent to Antony to ratify it anew.

In the year 717, when Augustus and Agrippa went to Sicily to fight Sextus Pompeius by sea, Mæcenas went with them; but soon after returned to appease some commotions which were rising at Rome: for though he usually attended Augustus in all his military expeditions, yet whenever there was any thing to be done at Rome either with the senate or people, he was always despatched thither for that purpose.

Upon the total defeat of Antony at Actium, Mæcenas returned to Rome, to take the government into his hands, till Augustus could settle some necessary affairs in Greece and Asia. Agrippa soon followed Mæcenas; and when Augustus arrived, he placed these two great men and faithful adherents, the one over his civil, the other over his military concerns. While Augustus was extinguishing the remains of the civil wars in Asia and Egypt, young Lepidus, the son of the triumvir, was forming a scheme to assassinate him at his return to Rome. This conspiracy was discovered at once, by the extraordinary vigilance of Mæcenas; who, as Velleius Paterculus says, "observing the rash councils of the headstrong youth with the same tranquillity and calmness as if nothing at all had been doing, instantly put him to death, without the least noise and tumult; and by that means extinguished another civil war in its very beginning."

The civil wars being now at an end, Augustus returned to Rome; and from this time Mæcenas indulged himself at vacant hours in literary amusements, and the conversation of men of letters. In the year 734 Virgil died, and left Augustus and Mæcenas heirs to what he had. Mæcenas was excessively fond of this poet, who, of all the wits of the Augustan age, stood highest in his esteem; and if the Georgics and the Æneid be owing to the good taste and encouragement of this patron, as there is some reason to think, posterity cannot commemorate him with too much gratitude. Horace may be ranked next to Virgil in Mæcenas's good graces: we have already mentioned how and at what time their friendship commenced. Propertius also acknowledges Mæcenas for his favourer and protector, lib. ii. eleg. 7.

Mæcenas. Nor must Varius be forgot, though we have nothing of his remaining; since we find him highly praised by both Virgil and Horace. He was a writer of tragedies; and Quintilian thinks he may be compared with any of the ancients. In a word, Mæcenas's house was a place of refuge and welcome to all the learned of his time; not only to Virgil, Horace, Propertius, and Varius, but to Fundarius, whom Horace extols as an admirable writer of comedies; to Fuscus Aristius, a noble grammarian, and Horace's intimate friend; to Plotius Tucca, who assisted Varius in correcting the Æneid after the death of Virgil; to Valgius, a poet and very learned man, who, as Pliny tells us, dedicated a book to Augustus, *De usu Herbarum;* to Asinius Pollio, an excellent tragic writer; and to several others, whom it would be tedious to mention. All these dedicated their works, or some part of them at least, to Mæcenas, and celebrated his praises in them over and over: and we may observe farther, what Plutarch tells us, that even Augustus himself inscribed his Commentaries to him and to Agrippa.

Mæcenas continued in Augustus's favour to the end of his life, but not uninterruptedly. Augustus had an intrigue with Mæcenas's wife: and though the minister bore this liberty of his master very patiently, yet there was a coldness on the part of Augustus, which, however, soon went off. Mæcenas died in the year 745; but at what age we cannot precisely determine, though we know he must have been old. He must have been older than Augustus, because he was a kind of tutor to him in his youth: and we find him often called *an old man* by Pædo Albinovanus, a contemporary poet, whose elegy upon his dead patron is still extant. He made Augustus his heir; and recommended his friend Horace to him in those memorable last words, "*Horatii Flacci, ut mei, memor esto,*" &c. Horace, however, did not probably survive him long, as there is no elegy of his upon Mæcenas extant, nor any account of one having ever been written, which there certainly would have been had Horace survived him any time. Nay, Father Sanadon, the French editor of Horace, will have it, that the poet died before his patron; and that these last words were found only in Mæcenas's will, which had not been altered.

Mæcenas is said never to have enjoyed a good state of health in any part of his life: and many singularities are related of his bodily constitution. Thus Pliny tells us, that he was always in a fever; and that, for three years before his death, he had not a moment's sleep. Though he was certainly an extraordinary man, and possessed many admirable virtues and qualities, yet it is agreed on all hands, that he was very luxurious and effeminate. "Mæcenas (says Vellcius Paterculus) was of the equestrian order, but sprung from a most illustrious origin. He was a man, who, when business required, was able to undergo any fatigue and watching; who consulted properly upon all occasions, and knew as well how to execute what he had consulted; yet a man who in seasons of leisure was luxurious, soft, and effeminate, almost beyond a woman. He was no less dear to Cæsar than Agrippa, but distinguished by him with fewer honours; for he always continued of the equestrian rank, in which he was born: not that he could not have been advanced upon the least intimation, but he never solicited it."

But let moralists and politicians determine of Mæcenas as they please, the men of letters are under high obligations to celebrate his praises and revere his memory: for he countenanced, protected, and supported, as far as they wanted his support, all the wits and learned men of his time; and that too, out of a pure and disinterested love of letters, when he had no little views of policy to serve by their means: whence it is no wonder, that all the protectors and patrons of learning, ever since, have usually been called *Mæcenas's.* Mæcenas, Maelstrom.

MAELSTROM, a very dangerous whirlpool on the the coast of Norway, in the 68th degree of latitude; in the province of Nordland, and the district of Lofoden and near the island of Moskoe, from whence it also takes the name of *Moskoe-strom.* Its violence and roarings exceed that of a cataract, being heard to a great distance, and without any intermission, except a quarter every sixth hour, that is, at the turn of high and low water, when its impetuosity seems at a stand, which short interval is the only time the fishermen can venture in; but this motion soon returns, and, however calm the sea may be, gradually increases with such a draught and vortex, as absorb whatever comes within their sphere of action, and keep it under water for some hours, when the fragments, shivered by the rocks, appear again. This circumstance, among others, makes strongly against Kircher and others, who imagine that there is here an abyss penetrating the globe, and issuing in some very remote parts, which Kircher is so particular as to assign, for he names the gulf of Bothnia. But after the most exact researches which the circumstances will admit, this is but a conjecture without foundation; for this and three other vortices among the Ferroe islands, but smaller, have no other cause than the collision of waves rising and falling, at the flux and reflux, against a ridge of rocks and shelves, which confine the water so that it precipitates itself like a cataract; and thus the higher the flood rises, the deeper must the fall be; and the natural result of this is a whirlpool or vortex, the prodigious suction whereof is sufficiently known by lesser experiments. But what has been thus absorbed, remains no longer at the bottom than the ebb lasts; for the suction then ceases, and the flood removes all attraction, and permits whatever had been sunk to make its appearance again. Of the situation of this amazing Moskoe-strom we have the following account from Mr Jonas Ramus: "The mountain of Helseggen, in Lofoden, lies a league from the island Ver, and betwixt these two runs that large and dreadful stream called *Moskoe-strom*, from the island Moskoe, which is in the middle of it, together with several circumjacent isles, as Ambaaren, half a quarter of a league northward, Iflesen, Hoeholm, Kieldholm, Suarven, and Buckholm. Moskoe lies about half a quarter of a mile south of the island of Ver, and betwixt them these small islands, Otterholm, Flimen, Sanflesen, Stockholm. Betwixt Lofoden and Moskoe, the depth of the water is between 36 and 40 fathoms; but on the other side, towards Ver, the depth decreases, so as not to afford a convenient passage for a vessel, without the risk of splitting on the rocks, which happens even in the calmest weather: when it is flood, the stream runs up the country between Lofoden and Moskoe with a boisterous rapidity: but the roar of its impetuous ebb

to

Maelstrom || Mæonides.

to the sea is scarcely equalled by the loudest and most dreadful cataracts; the noise being heard several leagues off, and the vortices or pits are of such an extent and depth, that if a ship comes within its attraction, it is inevitably absorbed and carried down to the bottom, and there beat to pieces against the rocks; and when the water relaxes, the fragments thereof are thrown up again. But these intervals of tranquillity are only at the turn of the ebb and flood, and in calm weather: and last but a quarter of an hour, its violence gradually returning. When the stream is most boisterous, and its fury heightened by a storm, it is dangerous to come within a Norway mile of it: boats, ships, and yachts having been carried away, by not guarding against it before they were within its reach. It likewise happens frequently, that whales come too near the stream and are overpowered by its violence; and then it is impossible to describe their howlings and bellowings in their fruitless struggles to disengage themselves. A bear once attempting to swim from Lofoden to Moskoe, with a design of preying upon the sheep at pasture in the island, afforded the like spectacle to the people; the stream caught him, and bore him down, whilst he roared terribly, so as to be heard on shore. Large stocks of firs and pine trees, after being absorbed by the current, rise again, broken and torn to such a degree as if bristles grew on them. This plainly shows the bottom to consist of craggy rocks, among which they are whirled to and fro. This stream is regulated by the flux and reflux of the sea; it being constantly high and low water every six hours. In the year 1645, early in the morning of Sexagesima Sunday, it raged with such noise and impetuosity, that on the island of Moskoe, the very stones of the houses fell to the ground."

MÆMACTERIA, sacrifices offered to Jupiter at Athens in the winter month Mæmacterion. The god surnamed Mæmactes was entreated to send mild and temperate weather, as he presided over the seasons, and was the god of the air.

MÆMACTERION, was the fourth month of the Athenian year, containing twenty-nine days, and answering to the latter part of our September, and the beginning of October. It received its name from the festival *Mæmacteria*, which was observed about this time. This month was called by the Bœotians *Alalcomenius*.

MÆNA: See SPARUS, ICHTHYOLOGY *Index*.

MÆNALUS, in *Ancient Geography*, a mountain of Arcadia sacred to the god Pan, and greatly frequented by shepherds. It received its name from Mænalus a son of Lycaon. It was covered with pine trees, whose echo and shade have been greatly celebrated by all the ancient poets.

MÆONIA, or MOEONIA, a country of Asia Minor, and forming part of Lydia; namely the neighbourhood of Mount Tmolus, and the country watered by the Pactolus. The rest on the sea coast was called Lydia. See LYDIA.

MÆONIDÆ, a name given to the muses, because Homer, their greatest and worthiest favourite, was supposed to be a native of Mæonia.

MÆONIDES, a surname of Homer, because, according to the opinion of some writers, he was born in Mæonia, or because his father's name was Mæon.

MÆOTIS PALUS or LACUS, *Mæotica Palus*, or *Mæoticus Lacus*, in *Ancient Geography*, a large lake or part of the sea between Europe and Asia, at the north of the Euxine, to which it communicates by the Cimmerian Bosphorus. It was worshipped as a deity by the Massagetæ. It extends about 390 miles from south-west to north-east, and is about 600 miles in circumference. Still called *Palus Mæotis*, reaching from Crim Tartary to the mouth of the Don.

Mæotis Palus || Maffei.

MÆSTLIN, MICHAEL, in Latin *Mæstlinus*, a celebrated astronomer of Germany, was born in the duchy of Wittemberg; but spent his youth in Italy, where he made a speech in favour of Copernicus's system, which brought Galilæo over from Aristotle and Ptolemy, to whom he had been hitherto entirely devoted. He afterwards returned to Germany, and became professor of mathematics at Tubingen; where, among his other scholars, he taught the great Kepler, who has praised several of his ingenious inventions, in his *Astronomia Optica*. Though Tycho Brahé did not assent to Mæstlin's opinion, yet he allowed him to be an extraordinary person, deeply skilled in the science of astronomy. Mæstlin published many mathematical and astronomical works; and died in 1590.

MAESTRICHT, an ancient town of the Netherlands; is about four miles in circumference, and strongly fortified. The inhabitants, the number of whom is estimated at 18,000, are noted for making excellent fire arms. It contains an arsenal, a handsome town-house, and a good library. Both Papists and Protestants are allowed the free exercise of their religion, and the magistrates are composed of both. It is seated on the river Maese, which separates it from Wyck, and with which it communicates by a handsome bridge. Maestricht revolted from the Spaniards in 1570, but was reduced in 1579. Louis XIV. became master of it in 1673; but it was restored to the states by the treaty of Nimeguen in 1678. It was again taken by the French in 1794, and remained in their possession till 1814. It now belongs to the kingdom of the Netherlands. E. Long. 5. 50. N. Lat. 50. 52.

MAFFÆUS, VEGIO, a Latin poet, born in Lombardy in 1407, was greatly admired in his time. He wrote epigrams, and a humorous supplement to Virgil, which he called *The thirteenth book of the Æneid*: this was as humorously translated into English a few years since by Mr Ellis. Maffaus wrote also some prose works. He was chancellor of Rome towards the end of the pontificate of Martin V.; and died in 1458.

MAFFEI, SCIPIO, a celebrated Italian poet, born of an illustrious and ancient family at Verona, in 1675. After having finished his studies, he took arms, and distinguished himself by his valour at the battle of Donawert; but he more particularly distinguished himself by his love of learning, which made him undertake several voyages into France, England, and Germany. He conversed with the learned in all those countries, and obtained their friendship and esteem. He was a member of the academy of the Arcadia at Rome, an honorary foreign member of that of Inscriptions at Paris; and died in 1755. He wrote many works in verse and prose, which are esteemed; the most known of which are, 1. The tragedy of Merope, of which

there

Maffei || Magazine.

there are two French translations in prose. 2. Ceremony, a comedy. 3. A translation, into Italian verse, of the first book of Homer's Iliad. 4. Many other pieces of poetry, in a collection entitled *Rhyme and Prose*, quarto. His principal works in prose are, 1. *Verona illustrata*. 2. *Istoria diplomatica*. 3. *Scienza cavalleresca;* an excellent work, in which he attacks duelling. 4. An edition of *Theatro Italiano*. 5. An edition of Cassiodorus on the Epistles, Acts of the Apostles, and Apocalypse. 6. *Galliæ Antiquitates quædam selectæ, atque in plures epistolas distributæ;* and several other works.

MAGADA, in *Mythology*, a title under which Venus was known and worshipped in Lower Saxony; where this goddess had a famous temple, which was treated with respect even by the Huns and Vandals when they ravaged the country. It is said to have been destroyed by Charlemagne.

MAGADOXO, the capital town of a kingdom of the same name, in Africa, and on the coast of Ajan. It is seated near the mouth of a river of the same name, defended by a citadel, and has a good harbour. The inhabitants are Mahometans. E. Long. 45. 15. N. Lat. 3. 0.

MAGAS, Magadis, (from μαγαδιζειν, "to sing, or play in unison or octave,") the name of a musical instrument in use among the ancients.

There were two kinds of *magades*, the one a string instrument, formed of 20 chords arranged in pairs, and tuned to unison or octave, so that they yielded ten sounds: the invention whereof is ascribed by some to Sappho; by others to the Lydians; and by some, to Timotheus of Miletus. The other was a kind of flute, which at the same time yielded very high and very low notes. The former kind was at least much improved by Timotheus of Miletus, who is said to have been impeached of a crime, because by increasing the number of chords he spoiled and discredited the ancient music.

MAGAZINE, a place in which stores are kept, of arms, ammunition, provisions, &c. Every fortified town ought to be furnished with a large magazine, which should contain stores of all kinds, sufficient to enable the garrison and inhabitants to hold out a long siege; and in which smiths, carpenters, wheelwrights, &c. may be employed in making every thing belonging to the artillery, as carriages, waggons, &c.

Powder Magazine, is that place where the powder is kept in very large quantities. Authors differ greatly both with regard to their situation and construction; but all agree that they ought to be arched and bomb-proof. In fortifications, they are frequently placed in the rampart; but of late they have been built in different parts of the town. The first powder magazines were made with Gothic arches: but M. Vauban finding them too weak, constructed them in a semicircular form; whose dimensions are 60 feet long within, and 25 broad; the foundations are eight or nine feet thick, and eight feet high from the foundation to the spring of the arch, the floor is two feet from the ground, which keeps it from dampness.

One of our engineers of great experience some time since had observed, that after the centres of semicircular arches are struck, they settle at the crown and rise up at the haunches, even with a straight horizontal extrados, and still much more so in powder magazines, whose outside at top is formed like the roof of a house, by two inclined planes joining in an angle over the top of the arch, to give a proper descent to the rain; which effects are exactly what might be expected agreeable to the true theory of arches. Now, as this shrinking of the arches must be attended with very ill consequences, by breaking the texture of the cement after it has been in some degree dried, and also by opening the joints of the voussoirs at one end, so a remedy is provided for this inconvenience with regard to bridges, by the *arch of equilibration* in Mr Hutton's book on bridges; but as the ill effect is much greater in powder magazines, the same ingenious gentleman proposed to find an arch of equilibration for them also, and to construct it when the span is 20 feet, the pitch or height 10 (which are the same dimensions as the semicircle), the inclined exterior walls at top forming an angle of 113 degrees, and the height of their angular point above the top of the arch equal to seven feet. This very curious question was answered in 1775 by the reverend Mr Wildbore, to be found in Mr Hutton's *Miscellanea Mathematica*. Magazine

Artillery Magazine. In a siege, the magazine is made about 25 or 30 yards behind the battery, towards the parallels, and at least three feet under ground, to hold the powder, loaded shells, portfires, &c. Its sides and roof must be well secured with boards to prevent the earth from falling in: a door is made to it, and a double trench or passage is sunk from the magazine to the battery, one to go in and the other to come out at, to prevent confusion. Sometimes traverses are made in the passages to prevent ricochet shot from plunging into them.

Magazine, on shipboard, a close room or storehouse, built in the fore or after-part of the hold to contain the gunpowder used in battle. This apartment is strongly secured against fire, and no person is allowed to enter it with a lamp or candle: it is therefore lighted, as occasion requires, by means of the candles or lamps in the *light-room* contiguous to it.

Magazine Air-Gun. See *Air-Gun*.

Magazine, Literary; a well-known species of periodical publications, of which the first that appeared was *The Gentleman's*, set on foot by the projector Mr Edward Cave in the year 1731: (see the article Cave). This, as Dr Kippis observes †, "may be considered as something of an epocha in the literary history of this country. The periodical performances before that time were almost wholly confined to political transactions, and to foreign and domestic occurrences; but the monthly magazines have opened a way for every kind of inquiry and information. The intelligence and discussion contained in them are very extensive and various: and they have been the means of diffusing a general habit of reading through the nation, which in a certain degree hath enlarged the public understanding. Many young authors, who have afterwards risen to considerable eminence in the literary world, have here made their first attempts in composition. Here too are preserved a multitude of curious and useful hints, observations, and facts, which otherwise might have never appeared; or if they had appeared in a more evanescent form, would have incurred the danger of being lost. If it

† *Biog. Brit.* vol. iii. Art. Cave.

Magazine || Magdeburg.

it were not an invidious task, the history of them would be no incurious or unentertaining subject. The magazines that unite utility with entertainment are undoubtedly preferable to those *(if there have been any such)* which have only a view to idle and frivolous amusement. It may be observed, that two of them, *The Gentleman's* and *The London*, which last was begun the year after the former, have, amidst their numerous rivals, preserved their reputation to the present day. They have both of them, in general, joined instruction with pleasure; and this likewise hath been the case with some others of a later origin.—The original London Magazine, it has been believed, has been discontinued for some years past.—The next oldest publication of this kind, is that entitled *The Scots Magazine:* which was commenced at Edinburgh a few years posterior to the appearance of the *Gentleman's* at London; which, like it, has survived many rivals, and has been continued, under different proprietors and editors, with various degrees of merit.

MAGDALEN, MARY. See MARY.

Religious of St MAGDALEN, a denomination given to divers communities of nuns, consisting generally of penitent courtezans; sometimes also called *Magdalenettes.* Such are those at Metz, established in 1452; those at Paris, in 1492; those at Naples, first established in 1324, and endowed by Queen Sancha, to serve as a retreat for public courtezans, who should betake themselves to repentance; and those of Rouen and Bourdeaux, which had their original among those of Paris in 1618. In each of these monasteries there are three kinds of persons and congregations; the first consist of those who are admitted to make vows, and these bear the name of *St Magdalen;* the congregation of St Martha is the second, and is composed of those whom it is not judged proper to admit to vows; finally, the congregation of St Lazarus is composed of such as are detained there by force.

The religious of St Magdalen at Rome were established by Pope Leo X. Clement VIII. settled a revenue on them; and farther appointed, that the effects of all public prostitutes, dying intestate, should fall to them; and that the testaments of the rest should be invalid unless they bequeathed a portion of their effects, which was to be at least a fifth part, to them.

MAGDALEN Hospital. See LONDON, N° 115.

MAGDALENA, one of the Marquesas islands, about five leagues in circuit, and supposed to be in S. Lat. 10. 25. W. Long. 138. 50. It was only seen at nine leagues distance by those who discovered it.

MAGDALENE's CAVE, a cave of Germany, and in Carinthia, 10 miles east of Gortz. It appears like a chasm in a rock, and at the entrance torches are lighted to conduct travellers. It is divided into several apartments, or halls, with a vast number of pillars formed by nature, which give it a beautiful appearance, they being as white as snow, and almost transparent. The bottom is of the same substance, insomuch that a person may fancy himself to be walking among the ruins of an enchanted castle, surrounded with magnificent pillars, some entire and others broken.

MAGDEBURG, a duchy of Germany, in the circle of Lower Saxony; bounded on the north by the duchy of Mecklenburgh, on the south and southwest by the principality of Anhalt and Halberstadt, on the east by Upper Saxony with part of Brandenburg, and on the west by the duchy of Wolfenbuttle. The Saale circle, and that of Luxkenwalde, are separated from the rest, and surrounded on all sides by a part of Upper Saxony. This country is for the most part level; but sandy, marshy, or overgrown with woods. There are salt springs in it, so rich that they are sufficient to supply all Germany with that commodity. The Holz circle is the most fruitful part of it. In the Saale circle, where wood is scarce, there is pit-coal: and at Rothenburg is a copper-mine worked. The duchy is well watered, for the Elbe passes through it; and the Saale, Havel, Aller, Ohre, and Elster, either rise in, or wash some part of it in their course. The whole duchy, exclusive of that part of the county of Mansfeldt, which is connected with it, is said to contain 29 cities, six towns, about 430 villages, and 330,000 inhabitants. The states of the country consist of the clergy, the nobility, and deputies of the cities. Before it became subject to the electoral house of Brandenburg, frequent diets were held in it; but at present no diets are held, nor have the states the direction of the finances as formerly. Before the Reformation, it was an archbishopric, subject in spirituals to the pope alone, and its prelate was primate of all Germany; but embracing the Reformation, it chose itself administrators, till the treaty of Munster, in 1648, when it was given, together with the bishopric of Halberstadt, to the elector of Brandenburg, as an equivalent for the Hither Pomerania, granted by that treaty to the king of Sweden. Lutheranism is the predominant religion here; but Calvinists, Jews, and Roman Catholics, are tolerated. Of the last there are five convents, who never embraced the Reformation. All the Lutheran parishes, amounting to 314, are subject to 16 inspectors, under one general superintendant; only the clergy of the old town of Magdeburg are under the direction of their senior. The Jews have a synagogue at Halle. The manufactures of the duchy are cloth, stuffs, stockings, linen, oil-skins, leather, and parchment; of which, and grain of all sorts, large quantities are exported. The arms of it are, Party per pale, ruby, and pearl. The king of Prussia, as duke of Magdeburg, sits and votes between the elector of Bavaria, as duke of Bavaria, and the elector palatine, as palsgrave of Lantern. Of the states of the circle of Lower Saxony he is the first. His matricular assessment for the duchy is 43 horse and 196 foot, or 1300 florins monthly; and to the chamber of Wetzlar, 343 florins and 40 kruitzers. For the civil government of the duchy there is a council of regency, with a war and demesne chamber; and for the ecclesiastical a consistory and general superintendant. The revenues of the duchy, arising from the salt-works, demesne, and taxes, some of which are very heavy and oppressive, are said to amount to 800,000 rixdollars annually. With respect to salt, every housekeeper in the Prussian dominion is obliged to buy a certain quantity for himself and wife; and also for every child and servant, horse, cow, calf, and sheep, that he possesses. The principal places are Magdeburg, Halle, and Glauche.

Magdeburg.

MAGDEBURG, a city of Germany, in a duchy of the same name, of which it is not only the capital, but that

of

Magdeburg.

of all Lower Saxony, and formerly of even all Germany. It stands on the Elbe, in E. Long. 11. 38. N. Lat. 52. 16. It is a city of great trade, strongly fortified, and very ancient. Its name signifies the *maiden city;* which, some imagine, took its rise from the temple of Venus, which is said to have stood here anciently, and to have been destroyed by Charlemagne. The founder of the city is supposed to have been Otho I. or his empress Editha, daughter to Edmund the Saxon king of England. The same emperor founded a Benedictine convent here, which he afterwards converted into an archbishopric, of which the archbishop was a count-palatine, and had very great privileges, particularly that of wearing the archiepiscopal pallium, and having the cross borne before him, besides many others. The first tournament in Germany is said to have been appointed near this city, by the emperor Henry the Fowler; but these pastimes were afterwards abolished, because they occasioned such envy and animosity among the nobility, that several of them killed one another upon the spot. The situation of the city is very convenient and pleasant, upon the banks of the Elbe, amidst spacious fruitful plains, and on the road betwixt High and Low Germany. It has been a great sufferer by fires and sieges; but by none so much as that in 1631, when the emperor's general, Count Tilly, took it by storm, plundered and set it on fire, by which it was entirely reduced to ashes, except the cathedral, the convent of our Lady, and a few cottages belonging to fishermen; of 40,000 burghers, not above 400 escaping. The soldiers spared neither age nor sex; but ripped up women with child, murdered sucking infants in sight of their parents, and ravished young women in the streets; to prevent which violation, many of them flung themselves into the Elbe, and others into the fire. The city is now populous, large, and well built, particularly the broad street and cathedral square. The principal buildings are the king's palace, the governor's house, the armoury, guildhall, and cathedral. The last is a superb structure in the antique taste, dedicated to St Maurice, which has a fine organ, the master pipe of which is so big, that a man can scarce clasp it with both arms; it also contains the tombs of the emperor Otho and the empress Editha; a fine marble statue of St Maurice, a porphyry font, an altar in the choir of one stone of divers colours, curiously wrought, and many other curiosities. They show here a bedstead and table which belonged to Martin Luther, when he was an Augustine friar in a cloister of this city before the Reformation. Among the relics, they pretended to have the bason in which Pilate washed his hands after his condemnation of our Saviour; the lantern which Judas made use of when he apprehended him; and the ladder on which the cock crowed after St Peter denied him. The chapter consists of a provost, sixteen major and seven minor canons; besides which, there are four other Lutheran collegiate foundations, and a Lutheran convent dedicated to our Lady, in which is a school or seminary. Here is also a gymnasium, with an academy, in which young gentlemen are instructed in the art of war. The canons of the chapter, which, except the change of religion, is upon the same footing as before the Reformation, must make proof of their nobility. The prebends and dignities are all in the gift of the elector; and the revenue of the provost is computed at 12,000 crowns a-year. Here is a great trade, and a variety of manufactures. The chief are those of woollen cloths and stuffs, silks, cottons, linen, stockings, hats, gloves, tobacco, and snuff. The city was formerly one of the Hanse and Imperial towns. Editha consort to Otho I. on whom it was conferred as a dowry, among many other privileges and advantages, procured it the grant of a yearly fair. The burgravate of this city was anciently an office of great power; having the civil and criminal jurisdiction, the office of hereditary cupbearer being annexed to it, and was long held as a fief of the archbishopric, but afterwards became an imperial fief, which was again conferred on the archbishopric by the elector of Saxony, upon certain conditions.

Magdeburg || Magellan.

MAGDOLUM, or MAGDALUM, in *Ancient Geography*, a town of the Lower Egypt, twelve miles to the south of Pelusium (Herodotus, Antonine), which doubtless is the Migdal or Magdol of Jeremiah.—Another MAGDALUM, or MIGDOL, denoting literally "a tower or place of strength," near the Red sea, (Moses); far to the south of the former.

MAGELLAN, FERDINAND DE, an eminent navigator, was by birth a Portuguese, of a good family. He served in the East Indies with reputation for five years under Albuquerque, and in 1510 he greatly distinguished himself at the battle of Malacca. Deeming his services poorly repaid by his own court, he entered into the employment of Charles V. king of Spain. He has been charged with peculation by some of his countrymen, who have assigned this as the reason why he quitted Portugal. In conjunction with Ruy Folero he formed the bold design of discovering a new passage by the west to the Molucca islands, which he offered to prove fell within the division of the globe assigned by the pope to the crown of Castile. It is said that he first proposed this enterprise to Emanuel king of Portugal, who rejected it, as opening a way for other nations to have access to the East Indies, the trade of which was now monopolized by the Portuguese. The proposition was agreed to by the king of Spain, and on the 20th of September 1519 Magellan sailed from San Lucar with five ships and 236 men under his command. His officers soon murmured at this appointment, considering it as a disgrace to be commanded by a renegade Portuguese; and when the fleet was lying at a port in South America which they named San Julian, a conspiracy was formed against him by three of the captains, which he discovered and quelled. He caused the captain of one of the ships to be assassinated, he boarded a second, and secured the mutineers, and the third submitted.

The coast on which they lay was that of Patagonia; and this first voyage contains accounts of the extraordinary stature of the natives. About the end of October they reached a cape, to which they gave the name of Dee las Virgines, forming the entrance of the straits which bear the name of Magellan. He exerted all his authority to induce his men to venture on this unknown passage, with the view of crossing a vast ocean beyond it, at the hazard of running short of provisions, of which a supply for three months was all he had remaining. One of his ships abandoned him, and made the best of her way to Europe. The rest proceeded, and on the

Magellan || Maggi.

27th of November they discovered the South sea, which made Magellan shed tears of joy. They continued their voyage over this ocean, now visited for the first time by Europeans, and were not long in suffering those evils from famine which they had apprehended. The men were reduced to the necessity of eating the hides with which the rigging was covered. The weather proved so uniformly calm and temperate, that they gave to the ocean the name of *Pacific*. They came in sight of the Ladrones on the 6th of March, so called from the thievish disposition of the inhabitants; and from thence they sailed to the Philippines. At Zebu Magellan obtained with little difficulty the conversion of the king; and on condition of his becoming a vassal of Spain, the Portuguese assisted him in reducing some neighbouring chieftains, and the cross was erected over some burnt villages.

With about 50 men Magellan landed upon Matan, whose chief refused to submit to Zebu, had an engagement between them lasted for the greater part of the day. His troops having spent all their ammunition, found it necessary to retreat, during which Magellan was wounded in the leg by an arrow, beaten down, and at last slain with a lance. This happened in 1521. By this act of imprudence he lost the honour of being the first circumnavigator of the globe, which fell to the lot of Cano, who brought his ship home by the East Indies. Yet Magellan has secured an immortal name among maritime discoveries, by the commencement of this great enterprize, in which he displayed extraordinary skill and resolution, but disregarded justice and humanity, then almost universal among adventurers of this class.

Straits of MAGELLAN, a narrow passage between the island of Terra del Fuego and the southern extremity of the continent of America. This passage was first discovered by Ferdinand Magellan, who sailed through it into the South sea, and from thence to the East Indies. Other navigators have passed the same way; but as these straits are exceedingly difficult, and subject to storms, it has been common to sail by Cape Horn, rather than through the straits of Magellan. See *Straits Le* MAIRE, and *Terra del Fuego*.

MAGELLANIC CLOUDS, whitish appearances like clouds, seen in the heavens towards the south pole, and having the same apparent motion as the stars. They are three in number, two of them near each other. The largest lies far from the south pole; but the other two are not many degrees more remote from it than the nearest conspicuous star, that is, about 11 degrees. Mr Boyle conjectures, that if these clouds were seen through a good telescope, they would appear to be multitudes of small stars, like the milky-way.

MAGGI, JEROME, in Latin *Magius*, one of the most learned men of the 16th century, was born at Anghiari in Tuscany. He applied himself to all the sciences, and even to the art of war; and distinguished himself so much in this last study, that the Venetians sent him into the island of Cyprus in quality of judge of the admiralty. When the Turks besieged Famagusta, he performed all the services that could be expected from the most excellent engineer: he invented mines and machines for throwing fire, by means of which he destroyed all the works of the besiegers, and in an instant overthrew what had cost the Turks infinite labour. But they had their revenge; for, taking the city in 1571, they plundered his library, carried him loaded with chains to Constantinople, and treated him in the most inhuman and barbarous manner. He nevertheless comforted himself from the example of Æsop, Menippus, Epictetus, and other learned men; and, after passing the whole day in the meanest drudgery, he spent the night in writing. He composed, by the help of his memory alone, treatises filled with quotations, which he dedicated to the Imperial and French ambassadors. These ministers, moved by compassion for this learned man, resolved to purchase him; but while they were treating for his ransom, Maggi found means to make his escape, and to get to the Imperial ambassador's house; when the grand visir being enraged at his flight, and remembering the great mischief he had done the Turks during the siege of Famagusta, sent to have him seized, and caused him to be strangled in prison in 1572. His principal works are, 1. A Treatise on the Bells of the Ancients. 2. On the Destruction of the World by Fire. 3. Commentaries on Æmilius Probus's Lives of Illustrious Men. 4. Commentaries on the Institutes. These works are written in elegant Latin. He also wrote a treatise on fortification in Italian; and a book on the situation of ancient Tuscany.

Maggi, Maggot.

He ought not to be confounded with his brother *Bartholomew Maggi*, a physician at Bologna, who wrote a treatise of gunshot wounds: nor with *Vincent Maggi*, a native of Bresse, and a celebrated professor of humanity, at Ferrara in Padua, who was the author of several works.

MAGGIORE, LAKE OF, a beautiful lake, situated on the confines of Switzerland and Italy, on the south side of the Alps. It is about 50 miles long and 4 or 5 miles broad, and is bent into a very irregular figure. Its height above the level of the sea, according to Count Moroso, is 732 feet. Its greatest known depth is 1800 feet. It receives the waters of the Tesino, Magia, and other rivers from the surrounding mountains. There are several islands in it, and two of these, called the Borromean islands, which have been beautified with gardens and buildings at a great expence, are much admired by travellers.

MAGGOT, the common name of the fly-worm bred in flesh, from the egg of the great blue flesh fly. Notwithstanding the distaste for this animal, its figure and structure of parts are greatly worth attending to; and may serve as a general history of the class of worms produced from the eggs of flies.

This animal is white and fleshy; its body is composed of a number of rings, like the bodies of caterpillars and other similar insects; and is capable, at the pleasure of the animal, of assuming different figures; being at times more or less extended in length, and consequently more or less thick.

Notwithstanding that this animal has no legs, it is able to move itself very swiftly; and in its first attempt to move, its body is extended to its greatest length, and assumes something of the figure of a pointed cone. The pointed part of the cone is the head of the animal, and is not separated from the next ring by any deeper furrow than the rest of the rings are from one another. In some states of the animal, one may see two short horns thrust out from the head; but more

generally

Maggot. generally two scaly hooks are observable: these are, however, sometimes hid, and have each of them a case or sheath, into which the animal can retract them at pleasure. These hooks are bent into an arch, the concavity of which is towards the plane on which the creature is placed; and they are thickest at their insertion in the head, and thence diminish gradually, till they terminate in a fine sharp point.

These two hooks are placed in a parallel direction, and can never come together, and therefore cannot serve in the place of teeth for grinding the food; but merely to pull and sever it in pieces, that it may be of a proper size for the mouth of the creature. Besides these hooks, the maggot has a kind of dart, which is about a third part of their length, and is placed at an equal distance between them. This is also brown and scaly like them; it is quite straight, and terminates in a fine point. The hooks have as it were two scaly thorns at their points; and this dart seems intended, by reiterated strokes, to divide and break the pieces of flesh these have separated from the rest into smaller parts. Immediately below the apertures for the egress of the hooks, is placed the mouth of the animal; the creature does not show this little opening unless pressed: but if the pressure is properly managed it will sufficiently open it, and there may be discovered within it a small protuberance, which may very naturally be supposed either the tongue or the sucker of the animal. The hooks in these creatures not only supply the place of teeth, but also of legs; since it is by fastening these hooks into the substance it is placed on, and then drawing up its body to it, that it pulls itself along.

The back of this creature lowers itself by degrees as it approaches the extremity of the belly: and near the place where the back begins to lower itself, are placed the creature's two principal organs of respiration. One may perceive there are two small roundish brown spots: they are very easily distinguishable by the naked eye, because the rest of the body of the creature is white; but if we take in the assistance of glasses, each of these spots appears to be a brown circular eminence raised a little above the rest of the body. On each of these spots one may also discover three oblong oval cavities, something of the shape of button holes; these are situated in a parallel direction to one another, and their length nearly in a perpendicular direction to that of the body of the animal. These apertures are so many stigmata or air-holes: openings destined to admit the air necessary to the life of the animal. It has six of these stigmata, three in each side of its body.

The great transparency of the body of this animal gives us an opportunity also to distinguish that it has on each side a large white vessel running the whole length of the body. It is easy to follow the course of these vessels through their whole length, but they are most distinct of all towards its hinder part; and they are always seen to terminate each in the brown spot above mentioned; this leaves us no room to doubt that they are the two principal tracheæ.

The ramifications of the two great tracheæ are very beautifully seen in this creature, especially on its belly; and it is remarkable, that no vessel analogous to the great artery in the caterpillar class can be discovered in these; though, if there were any such, their great transparence must needs make them very easily distinguishable; nor could its dilatations and contractions, if so considerable as in that class of animals, be less so. See CATERPILLAR, ENTOMOLOGY *Index*. Maggot || Magic.

MAGI, or MAGIANS, an ancient religious sect in Persia, and other eastern countries, who maintained that there were two principles, one the cause of all good, the other the cause of all evil: and, abominating the adoration of images, they worshipped God only by fire; which they looked upon as the brightest and most glorious symbol of Oromasdes, or the good god; as darkness is the truest symbol of Arimanius, or the evil god. This religion was reformed by Zoroaster, who maintained that there was one supreme independent Being; and under him two principles or angels, one the angel of goodness and light, and the other of evil and darkness; that there is a perpetual struggle between them, which shall last to the end of the world; that then the angel of darkness and his disciples shall go into a world of their own, where they shall be punished in everlasting darkness; and the angel of light and his disciples shall also go into a world of their own, where they shall be rewarded in everlasting light.

The priests of the magi were the most skilful mathematicians and philosophers of the ages in which they lived, insomuch that a learned man and a magian became equivalent terms. The vulgar looked on their knowledge as supernatural; and hence those who practised wicked and mischievous arts, taking upon themselves the name of *magians*, drew on it that ill signification which the word magician now bears among us.

This sect still subsists in Persia under the denomination of *gaurs*, where they watch the sacred fire with the greatest care, and never suffer it to be extinguished.

MAGIC, (MAGIA, *Μαγεια*), in its ancient sense, the science or discipline and doctrine of the magi, or wise men of Persia. See MAGI.

The origin of magic and the magi is ascribed to Zoroaster. Salmasius derives the very name from Zoroaster, who, he says, was surnamed *Mog*, whence Magus. Others, instead of making him the author of the Persian philosophy, make him only the restorer and improver thereof; alleging, that many of the Persian rites in use among the Magi were borrowed from the Zabii among the Chaldeans, who agreed in many things with the Magi of the Persians; whence some make the name *magus* common both to the Chaldeans and Persians. Thus Plutarch mentions, that Zoroaster instituted magi among the Chaldeans, in imitation whereof the Persians had theirs too.

MAGIC, in a more modern sense, is a science which teaches to perform wonderful and surprising effects.

The word *magic* originally carried with it a very innocent, nay, laudable meaning; being used purely to signify the study of wisdom, and the more sublime parts of knowledge; but in regard the ancient magi engaged themselves in astrology, divination, sorcery, &c. the term *magic* in time became odious, and was only used to signify an unlawful and diabolical kind of science, depending on the assistance of the devil and departed souls.

If any wonder how so vain and deceitful a science should gain so much credit and authority over men's minds, Pliny gives the reason of it. It is, says he,

Magic. because it has possessed itself of three sciences of the most esteem among men: taking from each all that is great and marvellous in it. Nobody doubts but it had its first origin in medicine; and that it insinuated itself into the minds of the people, under pretence of affording extraordinary remedies. To these fine promises it added every thing in religion that is pompous and splendid, and that appears calculated to blind and captivate mankind. Lastly, It mingled judicial astrology with the rest; persuading people, curious of futurity, that it saw every thing to come in the heavens. Agrippa divides magic into three kinds; natural, celestial, and ceremonial or superstitious.

Natural Magic is no more than the application of natural active causes to passive subjects; by means whereof many surprising, but yet natural, effects are produced.

In this way many of our experiments in natural philosophy, especially those of electricity, optics, and magnetism, have a kind of magical appearance, and among the ignorant and credulous might easily pass for miracles. Such, without doubt, have been some of those miracles wrought by ancient magicians, whose knowledge of the various powers of nature, there is reason to believe, was much greater than modern vanity will sometimes allow *.

* See *Stillingfleet's Origines Sacræ*, book ii. c. 2.

Baptista Porta has a treatise of natural magic, or of secrets for performing very extraordinary things by natural causes. The natural magic of the Chaldeans was nothing but the knowledge of the powers of simples and minerals. The magic which they called *theurgia*, consisted wholly in the knowledge of the ceremonies to be observed in the worship of the gods, in order to be acceptable. By virtue of these ceremonies they believed they could converse with spiritual beings, and cure diseases.

Celestial Magic borders nearly on judiciary astrology: it attributes to spirits a kind of rule or dominion over the planets, and to planets a dominion over men; and on those principles builds a ridiculous kind of system. See Astrology.

Superstitious or *Goetic Magic* consists in the invocation of devils. Its effects are usually evil and wicked, though very strange, and seemingly surpassing the powers of nature; supposed to be produced by virtue of some compact, either tacit or express, with evil spirits: but the truth is, these have not all the power that is usually imagined, nor do they produce those effects ordinarily ascribed to them.

This species of magic, there is every reason to believe, had its origin in Egypt, the native country of paganism. The first magicians mentioned in history were Egyptians; and that people so famed for early wisdom believed not only in the existence of dæmons, the great agents in magic (see Dæmon), but also that different orders of those spirits presided over the elements of earth, air, fire, and water, as well as over the persons and affairs of men. Hence they ascribed every disease with which they were afflicted to the immediate agency of some evil dæmon. When any person was seized with a fever, for instance, they did not think it necessary to search for any natural cause of the disease: it was immediately attributed to some dæmon which had taken possession of the body of the patient, and which could not be ejected but by charms and incantations. Magic.

These superstitious notions, which had spread from Egypt over all the east, the Jews imbibed during their captivity in Babylon. Hence we find them in the writings of the New Testament attributing almost every disease to which they were incident to the immediate agency of devils (see Possession). Many of the same impious superstitions were brought from Egypt and Chaldea by Pythagoras, and transmitted by him and his followers to the Platonists in Greece. This is apparent from the writers of the life of Pythagoras. Jamblicus, speaking of the followers of that philosopher, says expressly, that they cured certain diseases by incantations; and Porphyry adds, that they cured diseases both of the mind and of the body by songs and incantations. This was exactly the practice of the Egyptian priests, who were all supposed to keep up a constant intercourse with dæmons, and to have the power of controuling them by magical charms and sacred songs. Agreeably to this practice of his masters, we are told that Pythagoras directed certain diseases of the mind, doubtless those which he attributed to the agency of dæmons, to be cured partly by *incantations*, partly by *magical hymns*, and partly by *music*—και τας ψυχας δε νοσουντας παρεμυθειτο τους μεν επωδαις και μαγειαις τους δε μουσικη.

That there are different orders of created spirits, whether called dæmons or angels, whose powers intellectual and active greatly surpass the powers of man, reason makes probable, and revelation certain. Now it was the universal belief of the ancient nations, says the learned Mosheim †, and especially of the orientals, that certain sounds and words, for the most part barbarous, were highly grateful, and that others were equally disagreeable, to these spirits. Hence, when they wished to render a dæmon propitious, and to employ him on any particular office, the magicians composed their sacred songs of the words which were believed to be agreeable to him; and when it was their intention to drive him from themselves or others, they sung in a strain which they fancied a dæmon could not hear but with horror. From the same persuasion arose the custom of suspending from the neck of a sick person, whose disease was supposed to be inflicted by a dæmon, an amulet, sometimes made of gold and sometimes of parchment, on which was written one or more of those words which dæmons could not bear either to hear or to see: and in a didactic poem on the healing art still extant, we are taught by *Serenus Sammonicus*, that the word Abracadabra is an infallible remedy for a semitertian fever or ague; and to banish grief of heart, *Marcellinus* thinks nothing more effectual than the word καϱιαγκων. In more modern times, as we are informed by Agrippa, the words used by those in compact with the devil, to invoke him, and to succeed in what they undertake, are, *Dies, mies, jesquet, benedoefet, douvima, enitemaus.* There are a hundred other formulas of words composed at pleasure, or gathered from several different languages, or patched from the Hebrew or formed in imitation of it. And among the primitive Christians there was a superstitious custom, of which we suspect some remains may yet be found among the illiterate vulgar in different countries,

† See his edition of *Cudworth's Intellectual System.*

of

Magic. of fastening to the neck of a sick person, or to the bed on which he lay, some text from the New Testament, and especially the first two or three verses of the gospel of St John, as a charm undoubtedly efficacious to banish the disease.

That magicians who could thus cure the sick, were likewise believed to have the power of inflicting diseases, and of working miracles, by means of their subservient dæmons, need not be doubted. Ancient writers of good credit are full of the wonders which they performed. We shall mention a few of those which are best attested, and inquire whether they might not have been effected by other means than the interposition of dæmons.

The first magicians of whom we read are those who in Egypt opposed Moses. And we are told, that, when Aaron cast down his rod, and it became a serpent, they also did the like with their enchantments; "for they cast down every man his rod, and they became serpents." This was a phenomenon which, it must be confessed, had a very miraculous appearance; and yet there seems to have been nothing in it which might not have been effected by slight of hand. The Egyptians, and perhaps the inhabitants of every country where serpents abound, have the art of depriving them of their power to do mischief, so that they may be handled without danger. It was easy for the magicians, who were favoured by the court, to pretend that they changed their rods into serpents, by dexterously substituting one of these animals in place of the rod. In like manner they might pretend to change water into blood, and to produce frogs; for if Moses gave in these instances, as we know he did in others, any previous information of the nature of the miracles which were to be wrought, the magicians might easily provide themselves in a quantity of blood and number of frogs sufficient to answer their purpose of deceiving the people. Beyond this, however, their power could not go. It stopped where that of all workers in legerdemain must have stopt—at the failure of proper materials to work with. Egypt abounds with serpents; blood could be easily procured; and without difficulty they might have frogs from the river: But when Moses produced lice from the dust of the ground, the magicians, who had it not in their power to collect a sufficient quantity of these animals, were compelled to own this to be an effect of divine agency.

The appearance of Samuel to Saul at Endor is the next miracle, seemingly performed by the power of magic, which we shall consider. It was a common pretence of magicians, that they could raise up ghosts from below, or make dead persons appear unto them to declare future events; and the manner of their incantation is thus described by Horace:

——Pallor utrasque
Fecerat horrendas aspectu. Scalpere terram
Unguibus, et pullam divellere mordicus agnam
Cœperunt: cruor in fossam confusus, ut inde
Manes elicerent, animas responsa daturas.

"With yellings dire they fill'd the place,
And hideous pale was either's face.
Soon with their nails they scrap'd the ground,
And fill'd a magic trench profound
With a black lamb's thick-streaming gore, Magic.
Whose members with their teeth they tore;
That they might charm the sprights to tell
Some curious anecdotes from hell." FRANCIS.

Whether the witch of Endor made use of such infernal charms as these, the sacred historian has not informed us; but Saul addressed her, as if he believed that by some form of incantation she could recal from the state of departed spirits the soul of the prophet who had been for some time dead. In the subsequent apparition, however, which was produced, some have thought there was nothing more than a trick, by which a cunning woman imposed upon Saul's credulity, making him believe that some confidant of her own was the ghost of Samuel. But had that been the case, she would undoubtedly have made the pretended Samuel's answer as pleasing to the king as possible, both to save her own life, which appears from the context to have been in danger, and likewise to have procured the larger reward. She would never have told her sovereign, she durst not have told him, that he himself should be shortly slain, and his sons with him; and that the host of Israel should be delivered into the hands of the Philistines. For this reason many critics, both Jewish and Christian, have supposed that the apparition was really a dæmon or evil angel, by whose assistance the woman was accustomed to work wonders, and to foretel future events. But it is surely very incredible, that one of the apostate spirits of hell should have upbraided Saul for applying to a *sorceress*, or should have accosted him in such words as these: "Why hast thou disquieted *me*, to bring me up? Wherefore dost thou ask of *me*, seeing the *Lord* is departed from thee, and is become thine enemy! For the *Lord* hath rent the kingdom out of thine hand, and given it to thy neighbour, even to David. Because thou obeyedst not the voice of the *Lord*, therefore the *Lord* hath done this thing to thee this day." It is to be observed farther, that what was here denounced against Saul was really prophetic, and that the event answered to the propheey in every particular. Now, though we do not deny that there are created spirits of penetration vastly superior to that of the most enlarged human understanding; yet we dare maintain, that no finite intelligence could by its own mere capacity have ever found out the precise time of the two armies engaging, the success of the Philistines, the consequences of the victory, and the very names of the persons that were to fall in battle. Saul and his sons were indeed men of tried bravery, and therefore likely to expose themselves to the greatest danger: but after the menaces which he received from the apparition, he would have been impelled, one should think, by common prudence, either to change with the enemy, or to retire from the field without exposing himself, his sons, and the whole army, to certain and inevitable destruction; and his acting differently, with the consequences of his conduct, were events which no limited understanding could either foresee or certainly foretel. If to these circumstances we add the suddenness of Samuel's appearance, with the effect which it had upon the sorceress herself, we shall find reason to believe, that the apparition was that of no evil dæmon. There is not, we believe, upon record, another instance of any person's

Magic. son's pretending to raise a ghost from below, without previously using some magical rites or some form of incantation. As nothing of that kind is mentioned in the case before us, it is probable that Samuel appeared before he was called. It is likewise evident from the narrative, that the apparition was not what the woman expected; for we are told, that "when she saw Samuel, she cried out for fear." And when the king exhorted her not to be afraid, and asked what she saw, "the woman said, I see gods (*elohim*) ascending out of the earth." Now, had she been accustomed to do such feats, and known that what she saw was only her subservient dæmon, it is not conceivable that she could have been so frightened, or have mistaken her familiar for *elohim* in any sense in which that word can be taken. We are therefore strongly inclined to adopt the opinion of those who hold that it was Samuel himself who appeared and prophesied, not called up by the wretched woman or her dæmons, but, to her utter confusion, and the disgrace of her art, sent by God to rebuke Saul's madness in a most affecting and mortifying way, and to deter all others from ever applying to magicians or dæmons for assistance when refused comfort from heaven. For though this hypothesis may to a superficial thinker seem to transgress the rule of Horace—*Nec deus intersit*, &c.—which is as applicable to the interpretation of scripture, as to the introduction of supernatural agency in human compositions; yet he who has studied the theocratical constitution of Israel, the nature of the office which was there termed regal, and by what means the administration was in emergencies conducted, will have a different opinion; and at once perceive the *dignus vindice nodus*.

The sudden and wonderful destruction of the army of Brennus the Gaul, has likewise been attributed to magic, or, what in this inquiry amounts to the same thing, to the interposition of evil spirits, whom the priests of Apollo invoked as gods. Those barbarians had made an inroad into Greece, and invested the temple of Apollo at Delphi, with a view to plunder it of the sacred treasure. Their numbers and courage overpowered all opposition; and they were just upon the point of making themselves masters of the place, when, Justin informs us, that, to encourage the besieged, the priests and prophetess "advenisse deum *clamant*; eumque se vidisse desilientem in templum per culminis aperta fastigia. Dum omnes opem dei suppliciter implorant, juvenem supra humanum modum insignis pulchritudinis, comitesque ei duas armatas virgines, ex propinquis duabus Dianæ Minervæque ædibus occurrisse, nec oculis tantum hæc se perspexisse; audisse etiam stridorem arcus, ac strepitum armorum: proinde ne cunctarentur, diis antesignanis, hostem cædere, et victoriæ deorum socios se adjungere," summis obsecrationibus monebant. Quibus vocibus incensi, omnes certatim in prælium prosiliunt. Præsentiam Dei et ipsi statim senscre: nam et terræ motu portio montis abrupta Gallorum stravit exercitum, et confertissimi cunei non sine vulneribus hostium dissipati ruebant. Insecuta deinde tempestas est, quæ grandine et frigore saucios ex vulneribus absumpsit (A). Magic.

This was unquestionably an extraordinary event: and it must be ascribed either to the immediate interposition of the Supreme Being, to natural means, or to the agency of dæmons: there is no other alternative. But it is altogether incredible that the Supreme Being should have miraculously interposed to defend the temple of a pagan divinity. It is very difficult to suppose that an earthquake, produced in the ordinary course of nature, should have been foretold by the priests, or that it could have happened so opportunely for the preservation of their treasure from the hands of fierce barbarians. Nothing, therefore, it has been said, remains, but either to allow the earthquake to have been produced by evil spirits, or to deny the truth of the historian's relation. But the catastrophe of Brennus's army is recorded in the same manner by so many ancient writers of good credit, that we cannot call in question their veracity; and therefore, being unwilling to admit the agency of dæmons into this affair, it will be incumbent on us to show by what human contrivance it might have been effected; for its arrival at so critical a juncture will not easily suffer us to suppose it a mere *natural* event.

"The inclination of a Pagan priest (says Bishop Warburton*) to assist his god in extremity, will hardly be questioned; and the inclination of those at *Delphi* was not ill seconded by their public management and address. On the first rumour of Brennus's march against them, they issued orders, as from the oracle, to all the region round, forbidding the country people to secret or bear away their wine and provisions. The effects of this order succeeded to their expectations. The half-starved barbarians finding, on their arrival in *Phocis*, so great a plenty of all things, made short marches, dispersed themselves over the country, and revelled in the abundance that was provided for them. This respite gave time to the friends and allies of the god to come to his assistance. Their advantages of situation likewise supported the measures which they had taken for a vigorous defence. The town and temple of Delphi were seated on a bare and cavernous rock, defended on all sides with precipices instead

* *Julian.*

(A) "Called aloud that the god had arrived: That they had seen him leap into the temple through the aperture in the roof: That whilst they were all humbly imploring his help, a youth of more than human beauty, accompanied by two virgins in armour, had run to their assistance from the neighbouring temples of Diana and Minerva; and that they had not only beheld these things with their eyes, but had also heard the whizzing of his bow and the clangor of his arms. They therefore earnestly exhorted the besieged not to neglect the heavenly signal, but to sally out upon their enemies, and partake with the divinities of the glory of the victory." With these words the soldiers being animated, eagerly rushed to battle: and were themselves quickly sensible of the presence of the god; for part of the rock being torn away by an earthquake, rolled down upon the Gauls; whose thickest battalions being thus thrown into confusion, fled, exposed to the weapons of their enemies. Soon afterwards a tempest arose, which by cold and the fall of hailstones cut off the wounded.

Magic. instead of walls. A large recess within assumed the form of a theatre; so that the shouts of soldiers, and the sounds of military instruments, re-echoing from rock to rock, and from cavern to cavern, increased the clamour to an immense degree; which, as the historian observes, could not but have great effects on ignorant and barbarous minds. The playing off these panic terrors was not indeed of itself sufficient to repulse and dissipate an host of fierce and hungry invaders, but it enabled the defenders to keep them at bay till a more solid entertainment was provided for them, in the *explosion* and fall of that portion of the rock at the foot of which the greater part of the army lay encamped.

"Among the caverns in the sacred rock, there was one which, from an intoxicating quality discovered in the steam which issued from it, was rendered very famous by being fitted to the recipient of the priestess of Apollo (B). Now, if we only suppose this, or any other of the vapours emitted from the numerous fissures, to be endowed with that unctuous, or otherwise inflammatory quality, which modern experience shows to be common in mines and subterraneous places, we can easily conceive how the priests of the temple might, without the agency of dæmons, be able to work the wonders which history speaks of as effected in this transaction. For the throwing down a lighted torch or two into a chasm whence such a vapour issued, would set the whole into a flame; which, by suddenly rarefying and dilating the air, would, like fired gunpowder, blow up all before it. That the priests, the guardians of the rock, could be long ignorant of such a quality, or that they would divulge it when discovered, cannot be supposed. Strabo relates, that one *Onomarchus*, with his companions, as they were attempting by night to dig their way through to rob the holy treasury, were frightened from their work by the violent shaking of the rock; and he adds, that the same phenomenon had defeated many other attempts of the like nature. Now, whether the tapers which *Onomarchus* and his companions were obliged to use while they were at work, inflamed the vapour, or whether the priest of Apollo heard them at it, and set fire to a countermine, it is certain a quality of this kind would always stand them in stead. Such then (presumes the learned prelate) was the expedient (C) they employed to dislodge this nest of hornets, which had settled at the foot of their sacred rock; for the storm of thunder, lightning, and hail, which followed, was the natural effect of the violent concussions given to the air by the explosion of the mine."

Two instances more of the power of ancient magic we shall just mention, not because there is any thing particular or important in the facts, but because some credit seems to have been given to the narration by the discerning Cudworth. Philostratus, in his life of Apollonius Tyanæus, informs us that a *laughing demoniac* at Athens was cured by that magician, who ejected the evil spirit by threats and menaces; and the biographer adds, that the dæmon, at his departure, is said to have overturned a statue which stood before the porch where the cure was performed. The other instance is of the same magician freeing the city of Ephesus from the *plague*, by stoning to death an old ragged beggar whom Apollonius called the *plague*, and who appeared to be a *dæmon* by his changing himself into the form of a *shagged dog*.

That such tales as these should have been thought worthy of the slightest notice by the incomparable author of the Intellectual System, is indeed a wonderful phenomenon in the history of human nature. The whole story of Apollonius Tyanæus, as is now well known, is nothing better than a collection of the most extravagant fables *: but were the narrative such as that credit could be given to the facts here related, there appears no necessity in either case for calling in the agency of evil spirits by the power of magic.—The Athenians of that age were a superstitious people. Apollonius was a shrewd impostor, long practised in the art of deceiving the multitude. For such a man it was easy to persuade a friend and confidant to act the part of the *laughing demoniac;* and without much difficulty the statue might be so undermined as inevitably to tumble, upon a violent concussion being given to the ground at the time of the departure of the pretended dæmon. If so, this feat of magic dwindles down into a very trifling trick performed by means both simple and natural. The other case of the poor man at Ephesus, who was stoned to death, is exactly similar to that of those innocent women in our own country, whom the vulgar in the last century were instigated to burn for the supposed crime of witchcraft. We have no reason to suppose that an Ephesian mob was less inflammable or credulous than a British mob, or that Apollonius played his part with less skill than a Christian demonologist; and as the spirits of our witches, who were sacrificed to folly and fanaticism, were often supposed to migrate from their dead bodies into the bodies of *hares* or *cats* accidentally passing by, so might this impostor at Ephesus persuade his cruel and credulous instruments, that the spirit of their victim had taken possession of the body of the *shagged dog*.

Still it may be said, that in *magic* and *divination* events have been produced out of the ordinary course of nature; and as we cannot suppose the Supreme Being

Magic.

* See *Prideaux's Connexions, Brucker's History of Philosophy,* and *Mosheim's Notes on Cudworth's Intellectual System.*

(B) "In hoc rupis anfractu, media ferme montis altitudine, planities exigua est, atque in ea profundum terræ foramen, quod in oraculo patet, ex quo frigidus spiritus, vi quadam velut vento in sublimè expulsus, mentes vatum in vecordiam vertit, impletasque deo responsa consulentibus dare cogit." Just. lib. xxiv. c. 10.

(C) The learned author, by arguments too tedious to be here enumerated, confirms the reasoning which we have borrowed from him; and likewise shows from history, that the priests, before they came to extremities with the sacred rock, had entered into treaty with those barbarians, and paid them a large tribute to decamp and quit the country. This adds greatly to the probability of his account of the explosion; for nothing but the absolute impossibility of getting quit of their besiegers by any other means, could have induced the priests to hazard an experiment so big with danger to themselves as well as to their enemies.

Magic. Being to have countenanced such abominable practices by the interposition of his power, we must necessarily attribute those effects to the agency of demons, or evil spirits. Thus, when Æneas consulted the Sibyl, the agency of the inspiring god changed her whole appearance:

——————"Poscere fata
Tempus," ait: "Deus, ecce, Deus." Cui talia fanti
Ante fores, subito non vultus, non color unus,
Non comptæ mansêre comæ: sed pectus anhelum,
Et rabie fera corda tument; majorque videri,
Nec mortale sonans: afflata est numine quando
Jam propiore Dei.——————
——————"Aloud she cries,
"This is the time, inquire your destinies.
He comes, behold, a god!" Thus while she said,
And shivering at the sacred entry staid,
Her colour chang'd, her face was not the same;
And hollow groans from her deep spirit came;
Her hair stood up; convulsive rage possess'd
Her trembling limbs, and heav'd her lab'ring breast;
Greater than human kind she seem'd to look,
And with an accent more than mortal spoke.
Her staring eyes with sparkling fury roll,
When all the god came rushing on her soul."
DRYDEN.

In answer to this, it is to be observed, that the temple of Apollo at Cumæ was an immense excavation in a solid rock. The rock was probably of the same kind with that on which the temple of Delphi was built, full of fissures, out of which exhaled perpetually a poisonous kind of vapour. Over one of these fissures was the tripod placed, from which the priestess gave the oracle. Now we learn from St Chrysostom, that the priestess was a woman: "Quæ in tripodes sedens expansa malignum spiritum per interna immissum, et per genitales partes subeuntem excipiens, furore repleretur, ipsaque resolutis crinibus baccharetur, ex ore spumam emittens, et sic furoris verba loquebatur." By comparing this account with that quoted above from Justin, which is confirmed both by Pausanias and by Strabo, it is evident, that what Chrysostom calls *malignum spiritum* was a particular kind of vapour blown forcibly through the fissure of the rock. But if there be a vapour of such a quality as, if received *per partes genitales*, would make a woman furious, there is surely no necessity for calling into the scene at Cumæ the agency of a demon or evil spirit. Besides, it is to be remembered, that in all mystical and magical rites, such as this was, both the priests, and the persons consulting them, prepared themselves by particular kinds of food, and sometimes, as there is reason to believe, by human sacrifices*, for the approach of the god or demon whose aid they invoked. On the present occasion, we know from the poet himself, that a cake was used which was composed of poppy-seed and honey; and Plutarch speaks of a shrub called *leucophyllus*, used in the celebration of the mysteries of Hecate, which drives men into a kind of frenzy, and makes them confess all their wickedness which they had done or intended. This being the case, the illusions of fancy occasioned by poppy will sufficiently account for the change of the sibyl's appearance, even though the inhaled vapour should not have possessed that efficacy which Chrysostom and Justin attribute to it. Even some sorts of our ordinary food occasion strange dreams, for which onions in particular are remarkable. Excessive drunkenness, as is well known, produces a disorder named by the bacchanalians of this country *the blue devils*, which consists of an immense number of spectres, accompanied with extreme horror to the person who sees them. From these facts, which cannot be denied, there must arise a suspicion, that by using very unnatural food, such as human blood, the vilest of insects, serpents, and medicated cakes, by shutting themselves up in solitude and caves, and by devising every method to excite horrid and dreadful ideas or images in the fancy, the ancient magicians might by natural means produce every phenomenon which they attributed to their gods or demons. Add to this, that in ancient times magic was studied as a science. Now, as we cannot suppose that every one who studied it intended absolutely nothing, or that all who believed in it were *wholly* deceived; what can we infer, but that the science consisted in the knowledge of those drugs which produced the phantoms in the imagination, and of the method of preparing and properly employing them for that purpose? The celebrated Friar Bacon indeed, as far back as the 13th century, wrote a book *de Nullitate Magiæ*: but though we should allow that this book proved to demonstration, that in his time no such thing as magic existed, it never could prove that the case had always been so. At that time almost all the sciences were lost; and why not magic as well as others? It is likewise an undoubted fact, that magic at all times prevailed among the Asiatics and Africans more than among the Europeans. The reason doubtless was, that the former had the requisites for the art in much greater perfection than we. Human sacrifices were frequent among them; they had the most poisonous serpents, and the greatest variety of vegetable poisons, together with that powerful narcotic opium; all which were of essential use in mystical and magic rites. They had, besides, a burning sun, frightful deserts and solitudes; which, together with extreme fasting, were all called in to their assistance, and were sufficient to produce, by natural means, the most wonderful phenomena which have ever been attributed to magical incantations. Even in our own days, we have the testimony of two travellers, whom we cannot suspect to be either liars or enthusiasts, that both the Indians and Africans perform feats for which neither they nor the most enlightened Europeans can account. The one is Mr Grose, who visited the East Indies about the year 1762; and the other is Mr Bruce, who informs us, that the inhabitants of the western coast of Africa pretend to hold a communication with the devil, and verify their assertions in such a manner that neither he nor other travellers know what to make of it: but it does not from this follow, that Mr Bruce believed that communication to be real. We have all seen one of the most illiterate men that ever assumed the title of *Doctor*, perform feats very surprising, and such as even a philosopher would have been puzzled to account for, if he had not been previously let into the secret; and yet no man supposes that *Katterfelto* holds any communication

* Vide *Lucani Pharsalia*, lib vi. et *Arnob. C. Gentes*, lib. i.

Magic.

tion with the devil, although he has sometimes pretended it among people whose minds he supposed unenlightened.

Still it may be objected, that we have a vast number of histories of witches, who in the last century confessed, that they were present with the devil at certain meetings; that they were carried through the air, and saw many strange feats performed, too numerous and too ridiculous to be here mentioned. The best answer to this objection seems to be that given by Dr Ferriar in his essay on Popular Illusions *. "The solemn meeting of witches (says he) is supposed to be put beyond all doubt by the numerous confessions of criminals, who have described their ceremonies, named the times and places of their meetings, with the persons present, and who have agreed in their relations, though separately delivered. But I would observe, first, that the circumstances told of those festivals are in themselves ridiculous and incredible; for they are represented as gloomy and horrible, and yet with a mixture of childish and extravagant fancies, more likely to disgust and alienate than conciliate the minds of their guests. They have every appearance of uneasy dreams. Sometimes the devil and his subjects *say mass;* sometimes he *preaches* to them; more commonly he was seen in the form of a *black goat*, surrounded by imps in a thousand frightful shapes; but none of these forms are *new*, they all resemble known quadrupeds or reptiles. Secondly, I observe, that there is direct proof furnished even by demonologists, that *all* those supposed journeys and entertainments were nothing more than dreams. Persons accused of witchcraft have been repeatedly watched about the time they had fixed for their meeting: they have been seen to anoint themselves with soporific compositions; after which they fell into profound sleep; and on awaking several hours afterwards, they have related their journey through the air, with their amusement at the festival, and have named the persons whom they saw there." This is exactly comformable to the practice of the ancient magicians and diviners, and seems to be the true way of accounting, as well for many of the phenomena of magic, as for that extravagant and shameful superstition which prevailed so much during part of the last century, and by which such numbers of innocent men and women were cruelly put to death (c). We may indeed be assured, that the devil has it not in his power to reverse in a single instance the laws of nature without a divine permission; and we can conceive but one occasion (see POSSESSION) on which such permission could be given consistently with the wisdom and the goodness of God. All the tales, therefore, of diabolical agency in magic and witchcraft must undoubtedly be false; for a power, which the devil is not himself at liberty to exert, he cannot communicate to a human creature. Were the case otherwise; were those powers, "which (according to Johnson) only the controul of Omnipotence restrains from laying creation waste, subservient to the invocations of wicked mortals; were those spirits,—

——— of which the least could wield
The elements, and arm him with the force
Of all their regions,"——permitted to work miracles, and either to inflict or to remove diseases at the desire of their capricious votaries, how comfortless and wretched would be the life of man! But the matter has been long ago determined by the failure of Pharaoh's magicians; who, though by legerdemain they imitated some of the miracles of Moses, could not form the vilest insect, or stand before the disease which he inflicted upon them as well as upon others.

Magic.

The revival of learning, and the success with which the laws of nature have been investigated, have long ago banished this species of magic from all the enlightened nations of Europe. Among ourselves, none but persons grossly illiterate pay the least regard to magical charms; nor are they anywhere abroad more prevalent than among the inhabitants of Lapland and Iceland. These people, indeed, place an absolute confidence in the effects of certain idle words and actions: and ignorant sailors from other parts of the world are deceived by their assertions and their ceremonies. The famous *magical drum* of the Laplanders is still in constant use in that nation; and Scheffer, in his History of Lapland, has given an account of its structure.

This instrument is made of beech, pine, or fir, split in the middle, and hollowed on the flat side where the drum is to be made. The hollow is of an oval figure; and is covered with a skin clean dressed, and painted with figures of various kinds, such as stars, suns and moons, animals and plants, and even countries, lakes, and rivers; and of later days, since the preaching of Christianity among them, the acts and sufferings of our Saviour and his apostles are often added among the rest. All these figures are separated by lines into three regions or clusters.

There is, besides these parts of the drum, an index and a hammer. The index is a bundle of brass or iron rings, the biggest of which has a hole in its middle, and the smaller ones are hung to it. The hammer or drumstick is made of the horn of a rein-deer; and with this they beat the drum so as to make these rings move, they being laid on the top for that purpose. In the motion of these rings about the pictures figured on the drum, they fancy to themselves some prediction in regard to the things they inquire about.

What they principally inquire into by this instrument, are three things. 1. What sacrifices will prove most acceptable to their gods. 2. What success they shall have in their several occupations, as hunting, fishing, curing of diseases, and the like; and, 3. What is doing in places remote from them. On these several occasions they use several peculiar ceremonies, and place themselves in various odd postures as they beat the drum; which influences the rings to the one or the other side, and to come nearer to the one or the other set of figures. And when they have done this, they have a method of calculating a discovery, which they keep as a great secret, but which seems

* *Manchester Transactions*, vol. iii.

(c) For some farther account of popular illusions, see *Animal* MAGNETISM.

Magic, Magic Square.

merely the business of the imagination in the diviner or magician.

Magic Square, a square figure, formed of a series of numbers in mathematical proportion; so disposed in parallel and equal ranks, as that the sums of each row, taken either perpendicularly, horizontally, or diagonally, are equal.

Let the several numbers which compose any square number (for instance, 1, 2, 3, 4, 5, &c. to 25 inclusive, the square number) be disposed, in their natural order, after each other in a square figure of 25 cells, each in its cell; if now you change the order of these numbers, and dispose them in the cells in such manner, as that the five numbers which fill a horizontal rank of cells, being added together, shall make the same sum with the five numbers in any other rank of cells, whether horizontal or vertical, and even the same number with the five in each of the two diagonal ranks: this disposition of numbers is called a *magic square*, in opposition to the former disposition, which is called a *natural square*. See the figures following.

Natural Square.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Magic Square.

16	14	8	2	25
3	22	20	11	9
15	6	4	23	17
24	18	12	10	1
7	5	21	19	13

One would imagine that these magic squares had that name given them, in regard this property of all their ranks, which, taken any way, make always the same sum, appeared extremely surprising, especially in certain ignorant ages, when mathematics passed for magic: but there is a great deal of reason to suspect, that these squares merited their name still farther, by the superstitious operations they were employed in, as the construction of talismans, &c.; for according to the childish philosophy of those days, which attributed virtues to numbers, what virtue might not be expected from numbers so wonderful?

However, what was at first the vain practice of makers of talismans and conjurers, has since become the subject of a serious research among mathematicians; not that they imagine it will lead them to any thing of solid use or advantage (magic squares savour too much of their original to be of much use); but only as it is a kind of play, where the difficulty makes the merit, and it may chance to produce some new views of numbers, which mathematicians will not lose the occasion of.

Eman. Moschopulus, a Greek author of no great antiquity, is the first that appears to have spoken of magic squares: and by the age wherein he lived, there is reason to imagine he did not look on them merely as a mathematician. However, he has left us some rules for their construction. In the treatise of Cor. Agrippa, so much accused of magic, we find the squares of seven numbers, viz. from three to nine inclusive, disposed magically; and it must not be supposed that those seven numbers were preferred to all the other without some very good reason: in effect, it is because their squares, according to the system of Agrippa and his followers, are planetary. The square of 3, for instance, belongs to Saturn; that of 4 to Jupiter; that of 5 to Mars; that of 6 to the Sun; that of 7 to Venus; that of 8 to Mercury; and that of 9 to the Moon. M. Bachet applied himself to the study of magic squares, on the hint he had taken from the planetary squares of Agrippa, as being unacquainted with the work of Moschopulus, which is only in manuscript in the French king's library; and, without the assistance of any author, he found out a new method for those squares whose root is uneven, for instance 25, 49, &c. but he could not make any thing of those whose root is even.

Magic Square.

After him came M. Frenicle, who took the same subject in hand. A certain great algebraist was of opinion, that whereas the 16 numbers which compose the square might be disposed 20922789888000 different ways in a natural square (as from the rules of combination it is certain they may), they could not be disposed in a magic square above 16 different ways; but M. Frenicle showed, that they might be thus disposed 878 different ways: whence it appears how much his method exceeds the former, which only yielded the 55th part of magic squares of that of M. Frenicle.

To this inquiry he thought fit to add a difficulty that had not yet been considered: the magic square of 7, for instance, being constructed, and its 49 cells filled, if the two horizontal ranks of cells, and, at the same time, the two vertical ones, the most remote from the middle, be retrenched; that is, if the whole border or circumference of the square be taken away, there will remain a square whose root will be 5, and which will only consist of 25 cells. Now it is not at all surprising that the square should be no longer magical, because the ranks of the large ones were not intended to make the same sum, excepting when taken entire with all the seven numbers that fill their seven cells; so that being mutilated each of two cells, and having lost two of their numbers, it may be well expected, that their remainders will not any longer make the same sum. But M. Frenicle would not be satisfied, unless when the circumference or border of the magic square was taken away, and even any circumferences at pleasures, or, in fine, several circumferences at once, the remaining square was still magical: which last condition, no doubt, made these squares vastly more magical than ever.

Again, He inverted that condition, and required that any circumference taken at pleasure, or even several circumferences, should be inseparable from the square; that is, that it should cease to be magical when they were removed, and yet continue magical after the removal of any of the rest. M. Frenicle, however, gives no general demonstration of his methods, and frequently seems to have no other guide but chance. It is true, his book was not published by himself, nor did it appear till after his death, viz. in 1693.

In 1703, M. Poignard, canon of Brussels, published a treatise of sublime magic squares. Before him there had been no magic squares made but for serieses of natural numbers that formed a square; but M. Poignard made two very considerable improvements. 1. Instead of taking all the numbers that fill a square, for instance the 36 successive numbers, which would fill all the cells of a natural square whose side is 6, he only takes as many successive numbers as there are units

in

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in the side of the square, which, in this case, are six; and these six numbers alone he disposes in such manner in the 36 cells, that none of them are repeated twice in the same rank, whether it be horizontal, vertical, or diagonal; whence it follows, that all the ranks, taken all the ways possible, must always make the same sum, which M. Poignard calls repeated progression. 2. Instead of being confined to take these numbers according to the series and succession of the natural numbers, that is, in an arithmetical progression, he takes them likewise in a geometrical progression, and even in an harmonical progression. But with these two last progressions the magic must necessarily be different from what it was: in the squares filled with numbers in geometrical progression, it consists in this, that the products of all the ranks are equal; and in the harmonical progression, the numbers of all the ranks continually follow that progression: he makes squares of each of these three progressions repeated.

This book of M. Poignard gave occasion to M. de la Hire to turn his thoughts the same way, which he did with such success, that he seems to have well nigh completed the theory of magic squares. He first considers uneven squares: all his predecessors on the subject having found the construction of even ones by much the most difficult; for which reason M. de la Hire reserves those for the last. This excess of difficulty may arise partly from hence, that the numbers are taken in arithmetical progression. Now in that progression, if the number of terms be uneven, that in the middle has some properties, which may be of service; for instance, being multiplied by the number of terms in the progression, the product is equal to the sum of all the terms.

M. de la Hire proposes a general method for uneven squares, which has some similitude with the theory of compound motions, so useful and fertile in mechanics. As that consists in decompounding motions, and resolving them into others more simple; so does M. de la Hire's method consist in resolving the square that is to be constructed into two simple and primitive squares. It must be owned, however, it is not quite so easy to conceive these two simple and primitive squares in the compound or perfect square, as in an oblique motion to imagine a parallel and perpendicular one.

Suppose a square of cells, whose root is uneven, for instance 7; and that its 49 cells are to be filled magically with numbers, for instance the first 7; M. de la Hire, on the one side, takes the first 7 numbers, beginning with unity, and ending with the root 7; and on the other 7, and all its multiples to 49, exclusively; and as these only make six numbers, he adds 0, which makes this an arithmetical progression of 7 terms as well as the other; 0. 7. 14. 21. 28. 35. 42. This done, with the first progression repeated, he fills the square of the root magically: In order to this, he writes in the first seven cells of the first horizontal rank the seven numbers proposed in what order he pleases, for that is absolutely indifferent; and it is proper to observe here, that these seven numbers may be ranged in 5040 different manners in the same rank. The order in which they are placed in the first horizontal rank, be it what it will, is that which determines their order in all the rest. For the second horizontal rank, he places in its first cell, either the third, the fourth, the fifth, or the sixth number, from the first number of the first rank; and after that writes the six others in order as they follow. For the third horizontal rank, he observes the same method with regard to the second that he observed in the second with regard to the first, and so of the rest. For instance, suppose the first horizontal rank filled with the seven numbers in their natural order, 1, 2, 3, 4, 5, 6, 7; the second horizontal rank may either commence with 3, with 4, with 5, or with 6: but in this instance it commences with 3; the third rank therefore must commence with 5, the fourth with 7, the fifth with 2, the sixth with 4, and the seventh with 6. The commencement of the ranks which follow the first being thus determined, the other numbers, as we have already observed, must be written down in the order wherein they stand in the first, going on to 5, 6, and 7, and returning to 1, 2, &c. till every number in the first rank be found in every rank underneath, according to the order arbitrarily pitched upon at first. By this means it is evident, that no number whatever can be repeated twice in the same rank; and by consequence, that the seven numbers 1, 2, 3, 4, 5, 6, 7, being in each rank, must of necessity make the same sum.

Magic Square.

1	2	3	4	5	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	1
4	5	6	7	1	2	3
6	7	1	2	3	4	5

It appears, from this example, that the arrangement of the numbers in the first rank being chosen at pleasure, the other ranks may be continued in four different manners; and since the first rank may have 5040 different arrangements, there are no less than 20,160 different manners of constructing the magic square of seven numbers repeated.

1	2	3	4	5	6	7
2	3	4	5	6	7	1
3	4	5	6	7	1	2
4	5	6	7	1	2	3
5	6	7	1	2	3	4
6	7	1	2	3	4	5
7	1	2	3	4	5	6

1	2	3	4	5	6	7
7	1	2	3	4	5	6
6	7	1	2	3	4	5
5	6	7	1	2	3	4
4	5	6	7	1	2	3
3	4	5	6	7	1	2
2	3	4	5	6	7	1

The order of the numbers in the first rank being determined; if in beginning with the second rank, the second number 2, or the last number 7, should be pitched upon in one of these cases, and repeated; and in the other case, the other diagonal would be false unless the number repeated seven times should happen to be 4; for four times seven is equal to the sum of 1, 2, 3, 4, 5, 6, 7: and in general, in every square consisting of an unequal number of terms, in arithmetical progression, one of the diagonals would be false according to those two constructions, unless the term always repeated in that diagonal were the middle term of the progression. It is not, however, at all necessary to take the terms in an arithmetical progression: for, according to this method, one may construct a magic square of any numbers at pleasure, whether they be according to any certain progression or not. If they be in an arithmetical progression, it will be proper, out of the general method, to except those

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two constructions which produce a continual repetition of the same term in one of the two diagonals, and only to take in the case wherein that repetition would prevent the diagonal from being just; which case being absolutely disregarded when we computed that the square of 7 might have 20,160 different constructions, it is evident that by taking that case in, it must have vastly more.

To begin the second rank with any other number besides the second and the last, must not, however, be looked on as an universal rule: it holds good for the square of 7; but if the square of 9, for instance, were to be constructed, and the fourth figure of the first horizontal rank were pitched on for the first of the second, the consequence would be, that the fifth and eighth horizontal ranks would likewise commence with the same number, which would therefore be repeated three times in the same vertical rank, and occasion other repetitions in all the rest. The general rule, therefore, must be conceived thus: Let the number in the first rank pitched on, for the commencement of the second, have such an exponent for its quota; that is, let the order of its place be such, as that if an unit be taken from it, the remainder will not be any just quota part of the root of the square; that is, cannot divide it equally. If, for example, in the square of 7, the third number of the first horizontal rank be pitched on for the first of the second, such construction will be just; because the exponent of the place of that number, viz. 3, subtracting 1, that is, 2 cannot divide 7. Thus also might the fourth number of the same first rank be chosen, because 4—1, viz. 3, cannot divide 7; and, for the same reason, the fifth or sixth number might be taken: but in the square of 9, the fourth number of the first rank must not be taken, because 4—1, viz. 3, does divide 9. The reason of this rule will appear very evidently, by considering in what manner the returns of the same numbers do or do not happen, taking them always in the same manner in any given series. And hence it follows, that the fewer divisions the root of any square to be constructed has, the more different manners of constructing it there are; and that the prime numbers, i. e. those which have no divisions, as 5, 7, 11, 13, &c. are those whose squares will admit of the most variations in proportion to their quantities.

The squares constructed according to this method have some particular properties not required in the problem; for the numbers that compose any rank parallel to one of the two diagonals, are ranged in the same order with the numbers that compose the diagonal to which they are parallel. And as any rank parallel to a diagonal must necessarily be shorter, and have fewer cells than the diagonal itself, by adding to it the correspondent parallel, which has the number of cells by which the other falls short of the diagonal, the numbers of those two parallels, placed as it were end to end, still follow the same order with those of the diagonal: besides that their sums are likewise equal; so that they are magical on another account. Instead of the squares which we have hitherto formed by horizontal ranks, one might also form them by vertical ones; the case is the same in both.

First Primitive.

1	2	3	4	5	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	1
4	5	6	7	1	2	3
6	7	1	2	3	4	5

All we have hitherto said regards only the first primitive square, whose numbers, in the proposed example, were, 1, 2, 3, 4, 5, 6, 7; here still remains the second primitive, whose numbers are 0, 7, 14, 21, 28, 35, 42. M. de la Hire proceeds in the same manner here as in the former; and this may likewise be constructed in 20,160 different manners, as containing the same number of terms with the first. Its construction being made, and of consequence all its ranks making the same sum, it is evident, that if we bring the two into one, by adding together the numbers of the two corresponding cells of the two squares, that is, the two numbers of the first of each, the two numbers of the second, of the third, &c. and dispose them in the 49 corresponding cells of a third square, it will likewise be magical in regard to its rank, formed by the addition of equal sums to equal sums, which must of necessity be equal among themselves. All that remains in doubt is, whether or no, by the addition of the corresponding cells of the two first squares, all the cells of the third will be filled in such manner, as that each not only contains one of the numbers of the progression from 1 to 49, but also that this number be different from any of the rest, which is the end and design of the whole operation.

Second Primitive.

0	7	14	21	28	35	42
21	28	35	42	0	7	14
42	0	7	14	21	28	35
14	21	28	35	42	0	7
35	42	0	7	14	21	28
7	14	21	28	35	42	0
28	35	42	0	7	14	21

As to this it must be observed, that if in the construction of the second primitive square care has been taken, in the commencement of the second horizontal rank, to observe an order with regard to the first, different from what was observed in the construction of the first square; for instance, if the second rank of the first square began with the third term of the first rank, and the second rank of the second square commence with the fourth of the first rank, as in the example it actually does; each number of the first square may be combined once, and only once, by addition with all the numbers of the second. And as the numbers of the first are here 1, 2, 3, 4, 5, 6, 7, and those of the second, 0, 7, 14, 21, 18, 35, 42; by combining them in this manner we have all the numbers in the progression from 1 to 49, without having any of them repeated; which is the perfect magic square proposed.

Perfect Square.

1	9	17	25	33	41	49
24	32	40	48	7	8	16
47	6	14	15	23	31	39
21	22	30	38	46	5	13
37	45	4	12	20	28	29
11	19	27	35	36	44	3
34	42	43	2	10	18	26

The necessity of constructing the two primitive squares in a different manner does not at all hinder but that each of the 20,160 constructions of the one may be combined with all the 20,160 constructions of the other: of consequence, therefore, 20,160 multiplied by itself, which makes 406,425,600, is the number of different constructions that may be made of the perfect square, which here consists of the 49 numbers of the natural progression. But as we have already observed, that a primitive square of seven numbers repeated

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peated may have above 20,160 several constructions, the number 406,425,600 must come vastly short of expressing all the possible constructions of a perfect magic square of the 49 first numbers.

As to the even squares, he constructs them like the uneven ones, by two primitive squares; but the construction of primitives is different in general, and may be so a great number of ways; and those general differences admit of a great number of particular variations, which give as many different constructions of the same even square. It scarce seems possible to determine exactly, either how many general differences there may be between the construction of the primitive squares of an even square and an uneven one, nor how many particular variations each general difference may admit of; and, of consequence, we are still far from being able to determine the number of different constructions of all those that may be made by the primitive squares.

The ingenious Dr Franklin seems to have carried this curious speculation farther than any of his predecessors in the same way. He has constructed not only a magic square of squares, but likewise a magic circle of circles, of which we shall give some account for the amusement of our readers. The magic square of squares is formed by dividing the great square, as in Place CCXCVIII. The great square is divided into 256 small squares, in which all the numbers from 1 to 256 are placed in 16 columns, which may be taken either horizontally or vertically. The properties are as follow:

1. The sum of the 16 numbers in each column, vertical and horizontal, is 2056.

2. Every half column, vertical and horizontal, makes 1028, or half of 2056.

3. Half a diagonal ascending added to half a diagonal descending, makes 2056; taking these half diagonals from the ends of any side of the square to the middle thereof; and so reckoning them either upward or downward, or sidewise from left to right hand, or from right to left.

4. The same, with all the parallels to the half diagonals, as many as can be drawn in the great square; for any two of them being directed upward and downward, from the place where they begin to that where they end, their sums will make 2056. The same downward and upward in like manner: or all the same if taken sidewise to the middle, and back to the same side again. *N. B.* One set of these half diagonals and their parallels is drawn in the same square upward and downward. Another such set may be drawn from any of the other three sides.

5. The four corner numbers in the great square, added to the four central numbers therein, make 1028; equal to the half sum of any vertical or horizontal column which contains 16 numbers; and equal to half a diagonal or its parallel.

6. If a square hole (equal in breadth to four of the little squares) be cut in a paper, through which any of the 16 little squares in the great square may be seen, and the paper be laid on the great square, the sum of all the 16 numbers, seen through the hole, is equal to the sum of the 16 numbers in any horizontal or vertical column, viz. to 2056.

Magic Square.

The magic circle of circles, Plate CCXCVIII. is composed of a series of numbers from 12 to 75 inclusive, divided into eight concentric circular spaces, and ranged in eight radii of numbers, with the number 12 in the centre; which number, like the centre, is common to all these circular spaces, and to all the radii.

The numbers are so placed, that the sum of all those in either of the concentric circular spaces above mentioned, together with the central number 12, make 360; equal to the number of degrees in a circle.

The numbers in each radius also, together with the central number 12, make just 360.

The numbers in half of any of the above circular spaces, taken either above or below the double horizontal line, with half the central number 12, make 180; equal to the number of degrees in a semicircle.

If any four adjoining numbers be taken, as if in a square, in the radial divisions of these circular spaces, the sum of these, with half the central number, makes 180.

There are, moreover, included, four sets of other circular spaces, bounded by circles which are eccentric with respect to the common centre; each of these sets containing five spaces. The centres of the circles which bound them are at A, B, C, and D. The set whose centre is at A is bounded by dotted lines; the set whose centre is at C is bounded by lines of short unconnected strokes; and the set round D is bounded by lines of unconnected longer strokes, to distinguish them from one another. In drawing this figure by hand, the set of concentric circles should be drawn with black ink, and the four different sets of eccentric circles with four kinds of ink of different colours; as blue, red, yellow, and green, for distinguishing them readily from one another. These sets of eccentric circular spaces intersect those of the concentric, and each other; and yet the numbers contained in each of the eccentric spaces, taken all around through any of the 20 which are eccentric, make the same sum as those in the concentric, namely 360, when the central number 12 is added. Their halves also, taken above or below the double horizontal line, with half the central number, make 180.

Observe, that there is not one of the numbers but what belongs at least to two of the circular spaces, some to three, some to four, some to five; and yet they are all so placed as never to break the required number 360 in any of the 28 circular spaces within the primitive circle.

To bring these matters in view, all the numbers as above mentioned are taken out, and placed in separate columns as they stand around both the concentric and eccentric circular spaces, always beginning with the outermost and ending with the innermost of each set, and also the numbers as they stand in the eight radii, from the circumference to the centre: the common central number 12 being placed the lowest in each column.

1. In

Magic Square.

1. In the eight concentric circular spaces.

14	72	23	65	21	67	12	74
25	63	16	70	18	68	27	61
30	56	39	49	37	51	28	58
41	47	32	54	34	52	43	45
46	40	55	33	53	35	44	42
57	31	48	38	50	36	59	29
62	24	71	17	69	19	60	26
73	15	64	22	66	20	75	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

2. In the eight radii.

14	25	30	41	46	57	62	73
72	63	56	47	40	31	24	15
23	16	39	32	55	48	71	64
65	70	49	54	33	38	17	22
31	18	37	34	53	50	69	66
67	68	51	52	35	36	19	20
12	27	28	43	44	59	60	75
74	61	58	45	42	29	26	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

3. In the five eccentric circular spaces whose centre is at A.

14	72	23	85	21
63	16	70	18	68
39	49	37	51	28
54	34	52	43	45
33	53	35	44	42
48	38	50	36	59
24	71	17	69	19
73	15	64	22	66
12	12	12	12	12
360	360	360	360	360

4. In the five eccentric circular spaces whose centre is at B.

30	56	39	49	37
47	32	54	34	52
55	33	53	35	44
38	50	36	59	29
17	69	19	60	26
64	22	66	20	75
72	23	65	21	67
25	63	16	70	18
12	12	12	12	12
360	360	360	360	360

5. In the five eccentric circular spaces whose centre is at C.

46	40	55	33	53
31	48	38	50	36
71	17	69	19	60
22	66	20	75	13
65	21	67	12	74
16	70	18	68	27
56	39	49	37	51
41	47	32	54	34
12	12	12	12	12
360	360	360	360	360

6. In the five eccentric circular spaces whose centre is at D.

Magic Square of Magliabechi.

62	24	71	17	69
15	64	22	66	20
24	65	21	67	12
70	18	68	27	61
49	37	51	28	58
32	54	34	52	43
40	55	33	53	35
57	31	48	38	50
12	12	12	12	12
360	360	360	360	360

If, now, we take any four numbers, in a square form, either from N° 1. or N° 2. (we suppose from N° 1.) as in the margin, and add half the central number 12 to them, the sum will be 180; equal to half the numbers in any circular space taken above or below the double horizontal line, and equal to the number of degrees in a semicircle. Thus, 14, 72, 25, 63, and 6, make 180.

14	72
25	63

6

Magic Lantern. See DIOPTRICS, art. x.

MAGICIAN, one who practises magic, or hath the power of doing wonderful feats by the agency of spirits.

Among the eastern nations it seems to have been formerly common for the princes to have magicians about their court to confer with upon extraordinary occasions. And concerning these there hath been much disputation: some supposing that their power was only feigned, and that they were no other than impostors who imposed on the credulity of their sovereigns; while others have thought that they really had some unknown connexion or correspondence with evil spirits, and could by their means accomplish what otherwise would have been impossible for men. See the article MAGIC.

MAGINDANAO, or MINDANAO. See MINDANAO.

MAGISTERY, an old term in chemistry, given to precipitates. Thus, *magistery* and *precipitate* are synonymous; formerly *precipitate* was a general term, and *magistery* applied to particular precipitates, such as the magistery of bismuth, &c. See BISMUTH, CHEMISTRY *Index*.

MAGISTRATE, any public officer to whom the executive power of the law is committed either wholly or in part.

MAGLIABECHI, ANTONY, a person of great learning, and remarkable for an amazing memory, was born at Florence in 1633. His father died when he was only seven years old. His mother had him taught grammar and drawing, and then put him apprentice to one of the best goldsmiths in Florence. When he was about 16 years old, his passion for learning began to appear; and he laid out all his money in buying books. Becoming acquainted with Michael Ermini, librarian to the cardinal de Medicis, he soon perfected himself by his assistance in the Latin tongue, and in a little time became master of the Hebrew. His name soon became famous among the learned. A prodigious memory was his distinguishing talent; and he retained not only the sense of what he had read, but

Magliabechi ‖ Magnanimity.

but frequently all the words and the very manner of spelling. It is said that a gentleman, to make trial of the force of his memory, lent him a manuscript he was going to print. Some time after it was returned, the gentleman, coming to him with a melancholy countenance, pretended it was lost, and requested Magliabechi to recollect what he remembered of it; upon which he wrote the whole, without missing a word. He generally shut himself up the whole day, and opened his doors in the evening to the men of letters who came to converse with him. His attention was so absorbed by his studies, that he often forgot the most urgent wants of nature. Cosmo III. grand duke of Florence, made him his librarian; but he still continued negligent in his dress, and simple in his manners. An old cloak served him for a morning gown in the day and for bed-clothes at night. The duke, however, provided for him a commodious apartment in his palace, which he was with difficulty persuaded to take possession of; but which he quitted four months after, and returned to his house. He was remarkable for his extraordinary modesty, his sincerity, and his beneficence, which his friends often experienced in their wants. He was a patron of men of learning; and had the highest pleasure in assisting them with his advice and information, and in furnishing them with books and manuscripts. He had the utmost aversion at any thing that looked like constraint; and therefore the grand duke always dispensed with his personal attendance, and sent him his orders in writing. Though he lived a very sedentary life, he reached the 81st year of his age; and died in the midst of the public applause, after enjoying, during the latter part of his life, such affluence as few have ever procured by their learning. By his will, he left a very fine library to the public, with a fund for its support.

MAGLOIRE, St, a native of Wales in Great Britain, and cousin german to St Sampson and St Malo. He embraced a monastic life, and went into France, where he was made abbot of Dol, and after that a provincial bishop in Britanny. He afterwards founded a monastery in the island of Jersey, where he died on the 14th of October 575, about the age of 80. His remains were transported to the suburb of St Jacques, and deposited in a monastery of Benedictines, which was ceded to the fathers of the oratory in 1628. It is now the seminary of St Magloire, celebrated on account of the learned men whom it has produced.—This saint cultivated poetry with considerable success: the hymn which is sung at the feast of All Saints was composed by him; *Cœlo quos eadem gloria consecrat*, &c.

MAGNA ASSISA ELIGENDA, is a writ anciently directed to the sheriff for summoning four lawful knights before the justices of assize, in order to choose 12 knights of the neighbourhood, &c. to pass upon the great assize between such a person plaintiff and such a one defendant.

Magna Charta. See CHARTA.

MAGNANIMITY, denotes greatness of mind, particularly in circumstances of trial and adversity.—It has been justly observed of it, that it is the good sense of pride, and the noblest way of acquiring applause. It renders the soul superior to the trouble, disorder, and emotion, which the appearance of great danger might excite; and it is by this quality that heroes maintain their tranquillity, and preserve the free use of their reason, in the most surprising and dreadful accidents. It admires the same quality in its enemy; and fame, glory, conquests, desire of opportunities to pardon and oblige their opposers, are what glow in the minds of the brave. Magnanimity and courage are inseparable.

Beauties of History, under the word.

Magnanimity.

1. The inhabitants of Privernum being subdued and taken prisoners after a revolt, one of them being asked by a Roman senator, who was for putting them all to death, what punishment he and his fellow captives deserved? answered with great intrepidity, "We deserve that punishment which is due to men who are jealous of their liberty, and think themselves worthy of it." Plautinus perceiving that his answer exasperated some of the senators, endeavoured to prevent the ill effects of it, by putting a milder question to the prisoner: How would you behave (says he) if Rome should pardon you?" "Our conduct (replied the generous captive) depends upon yours. If the peace you grant be an honourable one, you may depend on a constant fidelity on our parts: if the terms of it be hard and dishonourable, lay no stress on our adherence to you." Some of the judges construed these words as menaces; but the wiser part finding in them a great deal of magnanimity, cried out, that a nation whose only desire was liberty, and their only fear that of losing it, was worthy to become Roman. Accordingly, a decree passed in favour of the prisoners, and Privernum was declared a municipium. Thus the bold sincerity of one man saved his country, and gained it the privilege of being incorporated into the Roman state.

2. Subrius Flavius, the Roman tribune, being impeached for having conspired against the life of the emperor Nero, not only owned the charge, but gloried in it. Upon the emperor's asking him what provocation he had given him to plot his death. Because I abhorred thee (said Flavius), though there was not in the whole army one more zealously attached to thee than I, so long as thou didst merit affection; but I began to hate thee when thou becamest the murderer of thy mother, the murderer of thy brother and wife, a charioteer, a comedian, an incendiary, and a tyrant." Tacitus tells us, that the whole conspiracy afforded nothing which proved so bitter and pungent to Nero as this reproach. He ordered Flavius to be immediately put to death, which he suffered with amazing intrepidity. When the executioner desired him to stretch out his neck valiantly, "I wish (replied he) thou mayest strike as valiantly."

3. When the Scythian ambassadors waited on Alexander the Great, they gazed attentively upon him for a long time without speaking a word, being very probably surprised, as they formed a judgment of men from their air and stature, to find that his did not answer the high idea they entertained of him from his fame. At last, the oldest of the ambassadors (according to Q. Curtius) addressed him thus: "Had the gods given thee a body proportionable to thy ambition, the whole universe would have been too little for thee. With one hand thou wouldst touch the east, and with the other the west; and, not satisfied with this, thou wouldst follow the sun, and know where he hides himself.

Magnanimity. himself. But what have we to do with thee? we never set foot in thy country. May not those who inhabit woods be allowed to live, without knowing who thou art, and whence thou comest? We will neither command over, nor submit to, any man. And that thou mayest be sensible what kind of people the Scythians are, know, that we received from heaven as a rich present, a yoke of oxen, a ploughshare, a dart, a javelin, and a cup. These we make use of, both with our friends and against our enemies. To our friends we give corn, which we procure by the labour of our oxen; with them we offer wine to the gods in our cup; and with regard to our enemies, we combat them at a distance with our arrows, and near at hand with our javelins. But thou, who boastest thy coming to extirpate robbers, thou thyself are the greatest robber upon earth. Thou hast plundered all nations thou overcamest; thou hast possessed thyself of Lydia, invaded Syria, Persia, and Bactriana; thou art forming a design to march as far as India; and now thou comest hither to seize upon our herds of cattle. The great possessions thou hast, only make thee covet more eagerly what thou hast not. If thou art good, thou oughtest to do good to mortals, and not deprive them of their possessions. If thou art a mere man, reflect always on what thou art. They whom thou shalt not molest will be thy true friends, the strongest friendships being contracted between equals; and they are esteemed equals who have not tried their strength against each other; but do not imagine that those whom thou conquerest can love thee."

Rapin's Hist. ann. 1199. 4. Richard I. king of England, having invested the castle of Chalus, was shot in the shoulder with an arrow; an unskilful surgeon endeavouring to extract the weapon, mangled the flesh in such a manner, that a gangrene ensued. The castle being taken, and perceiving he should not live, he ordered Bertram de Gourdon, who had shot the arrow, to be brought into his presence. Bertram being come, "What harm (said the king) did I ever do thee, that thou shouldest kill me?" The other replied with great magnanimity and courage, "You killed with your own hand my father and two of my brothers, and you likewise designed to have killed me. You may now satiate your revenge. I should cheerfully suffer all the torments that can be inflicted, were I sure of having delivered the world of a tyrant who filled it with blood and carnage." This bold and spirited answer struck Richard with remorse. He ordered the prisoner to be presented with one hundred shillings, and set at liberty: but Mercadee, one of the king's friends, like a true ruffian, ordered him to be flayed alive.

5. The following modern instance is extracted from a French work, entitled, *Ecole historique et morale du soldat*, &c. A mine, underneath one of the outworks of a citadel, was intrusted to the charge of a serjeant and a few soldiers of the Piedmontese guards. Several companies of the enemy's troops had made themselves masters of this work; and the loss of the place would probably soon have followed had they maintained their post in it. The mine was charged, and a single spark would blow them all into the air. The serjeant, with the greatest coolness, ordered the soldiers to retire, desiring them to request the king to take care of his wife and children; struck fire, set a match to the train, and sacrificed himself for his country. Magnanimity || Magnet.

MAGNESA, or MAGNESIA, in *Ancient Geography*, a town or a district of Thessaly, at the foot of Mount Pelius, called by Philip, the son of Demetrius, one of the three keys of Greece, (Pausanias).

MAGNESIA, or MAGNESIA ALBA, in *Chemistry*, a peculiar kind of earth. See CHEMISTRY *Index*.

Black Magnesia. See MANGANESE, CHEMISTRY and MINERALOGY *Index*.

MAGNESIA, in *Ancient Geography*, a maritime district of Thessaly, lying between the south part of the Sinus Thermaïcus and the Pegasæus to the south, and to the east of the Pelasgiotis. *Magnetes*, the people. *Magnesius* and *Magnessus*, the epithet; (Horace).

MAGNESIA, a town of Asia Minor on the Mæander, about 15 miles from Ephesus. Themistocles died there: it was one of the three towns given him by Artaxerxes, with these words, "to furnish his table with bread." It is also celebrated for a battle which was fought there, 190 years before the Christian era, between the Romans and Antiochus king of Syria. The forces of Antiochus amounted to 70,000 men according to Appian, or 70,000 foot and 12,000 horse according to Livy, which has been exaggerated by Florus to 300,000 men; the Roman army consisted of about 28,000 or 30,000 men, 2000 of whom were employed in guarding the camp. The Syrians lost 50,000 foot and 4000 horse; and the Romans only 300 killed, with 25 horse. It was founded by a colony from Magnesia in Thessaly; and was commonly called *Magnesia ad Mæandrum*, to distinguish it from another called *Magnesia ad Sipylum* in Lydia at the foot of Mount Sipylus.

Magnesia ad Sipylum, anciently *Tantalis*, the residence of Tantalus, and capital of Mæonia, where now stands the lake Sale. A town of Lydia, at the foot of Mount Sipylus, to the east of the Hermus; adjudged free under the Romans. It was destroyed by an earthquake in the reign of Tiberius.

MAGNET (*Magnes*) the LOADSTONE; a species of iron ore. See MAGNETISM, and MINERALOGY *Index*.

The magnet is also called *Lapis Heraeleus*, from Heraclea, a city of Magnesia, a port of the ancient Lydia, where it is said to have been first found, and from which it is usually supposed to have taken its name. Though others derive the word from a shepherd named *Magnes*, who first discovered it with the iron of his crook on Mount Ida. It is also called *Lapis Nauticus*, from its use in navigation; and *siderites*, from its attracting iron, which the Greeks call σιδηρος.

The ancients reckoned five kinds of magnets, different in colour and virtue; the Ethiopic, Magnesian, Bœotic, Alexandrian, and Natolian. They also took it to be male and female: but the chief use they made of it was in medicine; especially for the cure of burns and defluxions on the eyes.—The moderns, more fortunate in its application, employ it to conduct them in their voyages. See NAVIGATION.

The most distinguished properties of the magnet are, That it attracts iron, and that it points to the poles of the world; and in other circumstances also dips or inclines

Magnet. clines to a point beneath the horizon, directly under the pole; and that it communicates these properties, by touch, to iron. On which foundation are built the mariner's needles, both horizontal and inclinatory.

Attractive Power of the MAGNET was known to the ancients; and is mentioned even by Plato and Euripides, who call it the *Herculean stone*, because it commands iron, which subdues every thing else: but the knowledge of its directive power, whereby it disposes its poles along the meridian of every place, and occasions needles, pieces of iron, &c. touched with it, to point nearly north and south, is of a much later date; though the exact time of its discovery, and the discoverer himself, are yet in the dark. The first mention we have of it is in 1260, when Marco Polo the Venetian is said by some to have introduced the mariner's compass; though not as an invention of his own, but as derived from the Chinese, who are said to have had the use of it long before; though some imagine that the Chinese rather borrowed it from the Europeans.

Flavio de Gioia, a Neapolitan, who lived in the 13th century, is the person usually supposed to have the best title to the discovery; and yet Sir G. Wheeler mentions, that he had seen a book of astronomy much older, which supposed the use of the needle; though not as applied to the uses of navigation, but of astronomy. And in Guyot de Provins, an old French poet, who wrote about the year 1180, there is express mention made of the loadstone and the compass, and their use in navigation obliquely hinted at. Magnet, Magnetical.

The Variation of the MAGNET, or its declination from the pole, was first discovered by Seb. Cabot, a Venetian, in 1500; and the variation of that variation, by Mr Gellibrand, an Englishman, about the year 1625. See VARIATION.

Lastly, The dip or inclination of the needle, when at liberty to play vertically, to a point beneath the horizon, was first discovered by another of our countrymen, Mr R. Norman, about the year 1576. See the article *Dipping* NEEDLE.

MAGNETICAL NEEDLE. See *Needle, Magnetical.*

MAGNETISM.

INTRODUCTION.

General Principles.

1 General idea of magnetism. IF the mineral body called *magnet* or *loadstone* (an ore of iron which will be described under MINERALOGY) is brought within a moderate distance from a piece of iron or steel, or other ferruginous body, such as a small key, a sewing needle, or the like, the ferruginous body will approach the magnet; and if no obstacle intervene, will come in contact with it, and the two bodies will adhere together, so as to require an evident force to separate them from each other.

2 Magnetic polarity or directive power. Again, if a magnet be freely balanced, so that it be left at liberty to assume any direction, as if it be suspended by a thread, or made to float on the surface of water by placing it on a piece of cork, or wood, it will soon settle itself in one particular direction, so as to turn one part of its surface towards the northern point of the horizon, and the opposite part of course towards the southern point. These two parts of the surface of the magnet are called its *north* and *south* poles; this property of the magnet, of assuming this particular direction, is called its *polarity*, or its *directive power;* and when a magnet is placed so as to arrange itself in such a direction, it is said to *traverse.*

3 Declination of the magnet. The direction in which a suspended magnet finally settles is called the *magnetic meridian*, and it is different in different places, and at different times. It is generally, however, very different from the real meridian line, so that the north pole of a magnet declines a little to the east or west, and the south pole to the west or east. The difference of the magnetic from the astronomical meridian, is called the *declination*, or *variation* of the magnet; and the declination is said to be east or west, according as the north pole of the magnet verges to the one or the other of these points.

If an oblong magnet be suspended on a pivot by its centre of gravity, it does not settle in a perfectly horizontal position, but one of its poles is depressed below the horizontal line, and the other elevated as far above it, making an angle with the horizon that is also different on different parts of the earth's surface. This depression of one of the poles is called the *dipping* of the magnet. 4 Dipping of the magnet.

If two magnets that are each freely suspended, be brought within a moderate distance from each other, so that the north pole of the one is opposed to the south pole of the other, they will attract each other; and if no obstacle intervene, will rush together: but if the two north poles, or the two south poles, be mutually opposed, the magnets will repel each other. 5

Such are the leading properties of what is called the natural magnet; but what is of more importance, as we shall see hereafter, any piece of iron or steel may, by being rubbed with a natural magnet, or by some other processes to be afterwards explained, be made to acquire the same properties, and thus in every useful respect serve the same purposes as the natural magnet. These pieces of iron or steel, thus magnetised, are called *artificial* magnets; and when they are of a slender oblong form, they are termed *magnetic needles.* When afterwards we speak of the polarity, the declination, or the dipping of the magnetic needle, we would be understood as alluding to these slender, oblong, artificial magnets. 6

A straight line joining the two poles of a magnet is called its axis, and a line drawn transversely on the surface of the magnet, perpendicular to the axis, is called the *equator.* 7 Axis and equator of a magnet.

The properties of natural and artificial magnets above enumerated, are attributed to the agency of some unknown force or power, either inherent in the magnet, or imparted to it by the processes to which it is subjected. This force is sometimes called *magnetism*, but we shall for the present denominate it the *magnetic* 8 Magnetic power.

General Principles.

power, restricting the term magnetism to the science that illustrates and attempts to explain the phenomena.

9 Utility of magnetism.

The most important property of the magnet is its polarity, as it is by means of this that the mariner is enabled to find his way along the trackless ocean, where, before the discovery of this important property, he had no other guide but the stars, and could therefore seldom venture far from the coast. It is by this property too, that the miner is enabled to pursue a direct course through the bowels of the earth, or the traveller direct his steps through immense forests, or over sandy deserts. The uses of the magnet are therefore obvious and important, and the science which places these uses in the best point of view, and thus enables us to turn them to the greatest advantage, is well deserving our attention. Many of the facts to be related under this article are highly curious, and form a pleasing addition to those scientific amusements which are so well calculated to excite the attention of beginners in the study of experimental philosophy.

10 Works on magnetism.

It is unnecessary for us to attempt giving here a history of the origin and progress of our knowledge in magnetism. To a general reader, it would be uninteresting, and to such as are better informed, superfluous. We shall only mention the most important works that have appeared on the subject.

Few treatises expressly on magnetism have appeared in this country. In the year 1600, Dr Gilbert, a physician of Colchester, and the friend of Lord Bacon, published an excellent work *De Magnete et Corporibus Magneticis*, which is still perhaps the most valuable that we possess. Mr Cavallo's Treatise on Magnetism, first published in 1787, contains a great variety of facts and experiments; and a neat compendium of it is given in the 3d volume of the same author's Elements of Natural and Experimental Philosophy. Mr Cavallo's Treatise, and Mr Adams's Essay on Magnetism, form the substance of most of the compilations on this subject that have lately appeared.

To those who wish to enter minutely on the study of magnetism, the following list of foreign publications recommended by the late Professor Robison of Edinburgh will be acceptable.

Æpini Tentamen Theoriæ Magn. et Electr.

Eberhard's Tentam. Theor. Magnetismi, 1720.

Dissertations sur l'Aimant, par Dufay, 1728.

Muschenbrock Dissert. Physico-Experimentalis de Magnete.

Pieces qui ont emporté la prise de l'Acad. des Sciences à Paris sur la meilleure construction des Boussoles de declination. Recueil des pieces couronnées, tom. v.

Euleri Opuscula, tom. iii. continens Theoriam Magnetis. Berlin, 1751.

Æpini Oratio Academica, 1758.

Æpini item Comment. Petrop. nov. tom. x.

Anton. Brugmanni Tentamen Phil. de Materia Magnetica. Franqueræ, 1765.

There is a German translation of this work by Eisenbach, with many valuable additions.

Scarella de Magnete, 2 tom. fol.

Van Swinden sur l'Analogie entre les phenomenes Electriques et Magnetiques, 3 tom. 8vo.

Dissertation sur les Aimants Artificielles, par Nicholas Fuss, 1782.

Essai sur l'Origine des Forces Magnetiques, par M. Prevost. Magnetical Apparatus.

Sur les Aimants artificielles, par Rivoir. Paris, 1752.

Dissertatio de Magnetismo, par Sam. Klingenstein et Jo. Brander. Holm. 1752.

Description des Courants Magnetiques. Strasbourg, 1753.

Traité de l'Aimant, par Dalancé. Amst. 1687.

Besides the above original works, there are several valuable dissertations on magnetism by Des Cartes, Bernoulli, Euler, Du Tour, Coulomb, &c. either published in the miscellaneous works of these authors, or in the journals and transactions of academies.

We shall divide this article into three chapters. In the first we shall briefly describe the principal instruments made use of in magnetical experiments; in the second we shall endeavour to arrange under distinct heads or propositions, the leading principles of magnetism, point out how these may be illustrated by experiment, and explain the construction and uses of the magnetical apparatus, as they are deducible from the principles laid down; and in the third we shall notice the more important theories of magnetism, and exemplify the illustration of some of the preceding facts by that theory which we shall feel most disposed to adopt.

Chap. I. *Of Magnetical Apparatus.*

11 Magnetical instruments.

The principal instruments employed in magnetical experiments and observations, are reducible to three heads: First, *Magnets* of various kinds and forms; Secondly, *Magnetic needles* and *compasses*; and, Thirdly, the *Dipping needle*. Of compasses we have nothing to say here, having fully treated of them under Compass.

12 Magnets.

Magnets, as we have said, are either *natural* or *artificial*. The natural magnet may be cut into various forms, according to the experiments that are to be made with it. The most usual shape is oblong, having the poles at the two most distant extremities. Dr Gilbert, whom we shall mention more at large hereafter, made his magnets of a spherical shape, so as to resemble the terrestrial globe. Magnets of this shape are called *terrellæ*, or *little earths*, and have usually marked upon their surface the magnetic poles, meridian, and equator.

13 Armature of magnets.

Natural magnets of an oblong shape have usually a piece of soft iron attached to each pole, called the *conductor*; and another piece of soft iron placed so as to join two of the extremities of the former pieces, and usually furnished with a hook or hole in the middle. The magnet thus fitted up, as represented at fig. 1. is said to be *armed*, and the iron pieces CD, CD, are called the *armature* of the magnet AB. The magnet with its armature is commonly inclosed in a brass box, represented in the figure by the dotted lines DC, CC, CD: and to the upper part of the box is fixed a ring E, for holding the magnet. Plate CCXCVIII. Fig. 1.

One of the most common forms of the artificial magnet is that of an oblong bar, as NS, fig. 2. of which N is the north pole, and S the south, having the north end marked with a transverse notch. These bars are made of hardened steel, and are either sold separately, or, what is more common, in sets of six in a box. Fig. 2.

Another very common form of the artificial magnet is

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is that of a horse shoe, such as fig. 3. having the two poles N, S, brought near each other, and commonly united by a piece of soft iron or conductor. The horse-shoe magnets sometimes consist only of a single crooked bar; but they are frequently composed of several such bars united together by their flat surfaces, and inclosed in a leathern covering that envelopes all but the poles, and thus preserves the bars from rusting.

Fig. 3.

Instead of the very arched form of which horse-shoe magnets are usually made, they are sometimes constructed so as to form nearly a semicircle, and in this shape they are very convenient for several experiments.

Artificial magnets, like the natural, when of an oblong shape, are sometimes armed at each end, so as to enable them to apply both poles to a ferruginous body at the same time. One material advantage of the horse-shoe magnet is, that in it such an armature is unnecessary, as the poles are brought so near each other as easily to be applied to the object it is proposed to lift, as a key, &c.

14 Magnetic needle.

A *magnetic needle* is an oblong piece of steel, tempered so as commonly to assume the blue tinge that is seen in watch-springs, and supported on a brass point, so as, when left at liberty, to arrange itself in the magnetic meridian, but in a horizontal position. These needles are sometimes made pointed at both extremities; sometimes the northern extremity is made in the form of a cross; but perhaps the best form is that of the oblong, with extremities that are nearly obtuse, such as is represented at fig. 4. To balance the needle on its pivot, it is furnished near its middle with a hollow cap, which is formed of some substance that is not attracted by the magnet. The cap is usually of brass; but for nice experiments it is sometimes made of agate, as this latter does not wear so fast as brass, and consequently the needle will longer retain its original suspension.

Fig. 4.

15 Dipping needle.

The *dipping needle*, fig. 5. consists of an oblong bar of steel, AB, balanced between two horizontal slips of brass, CD, CD, so as when magnetised to form an angle with the horizon, equal to the dipping of the needle at the place where the instrument is made. The two horizontal slips of brass are either fixed to a graduated semicircle that is supported on a stand of wood, or more commonly they form diameters to a brass ring which is graduated on its circumference, and furnished with a ring, H, by which it may be held on the finger.

Fig. 5.

The construction and uses of these instruments will be fully explained in the next chapter; our only object here being to bring the reader acquainted with the names and general form of the instruments that are made use of in the experiments which we are about to describe, for illustrating the principles of magnetism.

Several smaller articles will be required by the experimentalist; but these are easily procured, and need no particular description. Such are a number of sewing needles of various sizes, soft iron bars, pieces of iron wire, small iron balls, iron filings, &c.

Chap. II. *Experimental Illustrations of the Principles of Magnetism.*

Sect. I. *Of Magnetical Polarity.*

We have stated (N° 3.) that when a magnet is suspended at perfect freedom, it assumes a certain determinate position with respect to the astronomical meridian. This is but a particular case of a much more general fact, which may be expressed by the following *proposition.*

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16 Iron arranges itself in a determinate position.

If *an oblong piece of iron be so adjusted, as to be at liberty to take any position; it will assume a certain determinate direction with respect to the axis of the earth, differing according to the place where the experiment is made.*

Experiment 1.—Take a moderately sized straight iron rod, as a piece of iron wire about the thickness of a goose quill, and about eight or ten inches long; pass it through one extremity of a large wine cork, so that it may be at right angles to the axis of the cork, and adjust it in such a manner that it may swim in water in a horizontal position. Now, provide a pretty large earthen vessel, as a hand bason or round deep dish, nearly filled with water; and when the water is free from agitation, cautiously put in the wire, in such a direction as not to be very far from the north and south line. The iron rod will, after some time, be found to have arranged itself so as, in Britain, to form an angle with the meridian of about 25 degrees.

This experiment requires some nicety, and it will sometimes be long before the iron assumes its proper position; but if due attention be paid to all the particulars above mentioned, it will at length arrange itself in the magnetic line. It is necessary that the rod should be placed not too far from the magnetic line, as, if it be laid at right angles to that line, it will never acquire the proper direction. The situation of the rod in this experiment is in the true magnetic line, so far as respects the meridian; but, as it is horizontal, it is not in the position that a magnet would assume, if freely suspended by its centre of gravity. An iron rod may, however, be made to take such a position, as well as a magnet.

Exper. 2.—Instead of passing the iron rod through the extremity of a cylindrical or conical piece of cork, let it be passed through the centre of a spherical piece of cork or wood, so that the centre of gravity may coincide with the centre of the sphere, and let the whole be of such a specific gravity as to remain suspended in any part of the water, without ascending or descending. If the iron rod thus fitted be placed as in the last experiment, it will at length arrange itself in the true magnetic direction, so as to make an angle of about 25 degrees with the meridian, and with one extremity depressed below the horizon at an angle of about 73 degrees.

17 Polarity of iron temporary.

These experiments were contrived by Dr Gilbert, and fully shew that the property of assuming a determinate direction with respect to the earth's axis is not confined to magnets, or iron rendered magnetical by the usual processes. There is, however, a remarkable difference between the polarity of unmagnetised iron and that of natural and artificial magnets. It is of no consequence in the former which extremity be placed towards the north, or which below the surface of the water, as either will retain the position it first acquired, unless disturbed by agitation, or by the proximity of a magnet; and both extremities may easily be made to change situations. *The effect produced on the iron is therefore temporary.* But if a magnetic needle be

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freely suspended, the same extremity always points towards the north, and this northern extremity always dips below the horizon, at least in these northern latitudes; and if the position of the needle be disturbed by mechanical motion, or by the application of a magnet, it will be resumed when the disturbing cause is removed. *The polarity of magnets therefore is permanent.*

18 Of magnets permanent.

19 Declination varies.

We have said that the magnetic line varies at different times, and in different places. The declination of the magnet is so uncertain as to impose great impediments to the art of navigation, as it is necessary in the course of a long voyage, frequently to ascertain the degree of variation for any particular time or place. The method of doing this is mentioned under COMPASS. The declination observed in different places at different times, has been laid down in tables; and as such tables are very useful, we shall here subjoin one, given by Mr Cavallo.

Latitude.	*Longitude.*	*Declination.*	*Years in which the observations were made.*
North.	West.	East.	
70° 17′	163° 24′	30° 21′	1779
69 38	164 11	31 0	1778
66 36	167 55	27 50	
65 43	170 34	27 58	
63 58	165 48	26 25	
59 39	149 8	22 54	
58 14	139 19	24 40	
55 12	135 0	23 29	
53 37	134 53	20 32	
		West.	
50 8	4 40	20 36	1776
48 44	5 0	22 38	
40 41	11 10	22 27	
33 45	14 50	18 7	
31 8	15 30	17 43	
28 30	17 0	14 0	
23 54	18 20	15 4	
20 30	20 3	14 35	
19 45	20 39	13 11	
16 37	22 50	10 33	
15 25	23 36	9 15	
13 32	23 45	9 25	
12 21	23 54	9 48	
11 51	24 5	8 19	
8 55	22 50	8 58	
6 29	20 5	9 44	
4 23	21 2	9 1	
3 45	22 34	8 27	
2 40	24 10	7 42	
1 14	26 2	5 35	
0 51	27 10	4 59	
0 7	27 0	4 27	
South.			
1 13	28 58	3 12	
2 48	29 37	2 52	
3 37	30 14	2 14	
4 22	30 29	2 54	
5 0	31 40	1 26	
South.	West.	West.	
6° 0′	32° 50′	0° 6′ East.	1776
6 45	33 30	0 35 West.	
7 50	34 20	0 7	
8 43	34 20	0 15 East.	
9 1	34 50	0 44 West.	
10 4	34 49	0 38 East.	
12 40	34 49	1 12	
13 23	34 49	1 1	
14 11	34 49	1 9	
15 33	34 40	1 15	
16 12	35 20	2 4	
18 30	35 50	3 2	
20 8	36 1	5 26	
21 37	36 9	3 24	
24 17	36 8	3 24	
26 47	34 27	3 44	
28 19	32 20	1 58	
30 25	26 28	2 37 West.	
33 43	16 30	4 44	
35 37	9 30	5 51	
38 52	23 20 East.	22 12 East.	
40 36	173 34	13 47	
42 4	167 32	13 17 West.	
44 52	155 47	9 28	
46 15	144 50	14 48	
48 41	69 10	27 39	

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It is of still more importance to know the progressive change of the declination at any certain place, and we shall therefore give here the following table of the declination as observed at London in different years, from 1576 to 1808.

Years.	*Declination.*	*Observers.*
	East.	
1576	11° 15′	Burrows.
1580	11 11	
1612	6 10	
1622	6 0	Gunter.
1633	4 6	
1634	4 5	Gellibrand.
	West.	
1656	0 0	Bond.
1665	1 22½	Gellibrand.
1666	1 35½	
1672	2 30	Halley.

Experimental Illustrations.

Years.	Declination.	Observers.
	West.	
1683	4 30	
1692	6 0	
1700	8 0	
1717	10 42	
1723	14 17	
1748	17 40	Graham.
1760	19 12	
1765	20 0	
1770	20 35	
1773	21 9	Heberden.
1775	21 30	
1780	22 10	
1785	22 50	
1787	23 19	Gilpin.
1790	23 34	
1795	23 57	Gilpin.
1800	24 7	
1802	24 6	Gilpin.
1805	24 8	

From this last table it appears that when the declination was first observed, the north pole of the magnetic needle declined to the eastward of the meridian of London, that since that time it advanced continually towards the west till 1657, when the needle pointed due north and south, and that ever since it has continually declined more and more towards the west, in which direction it appears to be still advancing.

At Paris, in different years, the declination has been observed as follows:

In 1550	-	8° 0′	East.
1640	-	3 0	
1660	-	0 0	
1681	-	2 2	West.
1759	-	18 10	
1760	-	18 20	
From 1792 to 1794		21° 54′	Stationary.
In 1798	-	22 17	
1799	-	22 0	
1800	-	22 12	
1801	-	22 1	
1802	-	21 45	
1803	-	21 59	
1804	-	22 10	
At Jamaica 1805	-	6 30	E.

At Alexandria in Egypt,

In 1761	-	11° 4′	W.
1798	-	13 6	

At Cairo,

In 1761	-	12° 25′	W.
1798	-	12	

The declination of the magnetic needle has been found to be different, even at different hours of the day. The following table contains the result of some observations made by Mr Canton on the daily variation, and on the mean variation of each month.

The declination observed at different hours of the same day. June 27. 1759.

	H. M.	Decl. W.	Degrees of the Therm.
Morning.	0 18	12° 2′	62°
	6 4	18 58	62
	8 30	18 55	65
	9 2	18 54	67
	10 20	18 57	69
	11 40	19 4	68½
Afternoon.	0 50	19 9	70
	1 38	19 8	70
	3 10	19 8	68
	7 20	18 59	61
	9 12	19 6	59
	11 40	18 51	57½

The mean Variation for each Month in the Year.	
January,	7′ 8″
February,	8 52
March,	11 17
April,	12 26
May,	13 0
June,	13 21
July,	13 14
August,	12 19
September,	11 43
October,	10 36
November,	8 9
December,	6 58

Table of the Mean Monthly Variation of the Magnetic Needle for 26 Years at London:*

* *Phil. Trans.* 1806. p. 416.

Years	January.	February.	March.	April.	May.	June.	July.	August.	Septemb.	October.	Novemb	Decemb.
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
1786	-	-	-	-	-	-	-	-	23 16.4	23 18.4	23 17.3	23 18.3
1787	23 19.2	23 19.8	23 20.3	23 18.5	23 17.0	23 18.3	23 19.6	23 21.9	23 22.8	23 24.5	23 25.0	23 25.8
1788	23 25.6	-	-	-	-	23 28.9	23 29.8	-	-	23 32.1	-	-
1789	-	-	-	-	-	23 34.2	-	-	-	-	-	23 41.2
1790	23 38.9	-	-	-	-	-	23 39.0	-	-	-	-	-
1791	23 35.6	-	-	23 36.0	-	-	23 36 7	-	-	-	-	-
1792	23 41.1	-	-	-	23 41.9	-	-	23 43.6	23 43.9	23 45.6	23 45.9	23 45.2
1793	23 46.9	23 48.3	23 48.8	23 46.2	23 47.3	23 48.5	23 50.5	23 48.6	23 52.6	23 52.3	23 51.9	23 52.3
1794	23 54.2	-	-	-	-	..	23 54.4	23 57.2	23 58.1	-	-	-
1795	-	-	23 57.5	-	-	23 57.1	23 57.1	-	24 0.4	-	-	23 59.4
1796	-	-	24 1.1	-	-	23 58.7	23 59.2	-	24 0.1	-	-	24 1.3
1797	-	-	24 1.5	-	-	24 0.2	24 0.3	-	24 1.4	-	-	24 1.3
1798	-	-	24 0.6	-	-	24 59.4	24 0.0	-	24 1.4	-	-	24 1.4
1799	-	-	24 1.1	-	-	24 0.6	24 1.8	-	24 2.9	-	-	24 2.3
1800	-	-	24 3.6	-	-	24 1.8	24 3.0	-	24 3.6	-	-	24 3.3
1801	-	-	24 5.2	-	-	24 2.8	24 4.1	-	24 3.8	-	-	24 5.4
1802	-	-	24 6.9	-	-	24 5.3	24 6.0	-	24 8 7	-	-	24 6.8
1803	-	-	24 8.0	-	-	24 7.0	24 7.9	-	24 10.5	-	-	24 10.7
1804	-	-	24 9 4	-	-	24 6.0	24 8.4	-	24 8 9	-	-	24 9.2
1805	-	-	24 8.7	-	-	24 7.8	24 7.8	-	24 10.0	-	-	24 9.4

Charts

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Charts have been constructed for shewing the declination of the needle in various parts of the earth by means of curve lines. Respecting these charts and several other circumstances with regard to this subject, see VARIATION *of the Compass*.

It may not be improper here to point out the general method of applying the polarity of the magnet to the useful purposes of navigation, mining, &c.

A mariner's compass, or magnetic needle in a case, is so placed as to be as little as possible disturbed by the motion of the vessel, person, &c. In a ship, it is placed in the binnacle (see BINNACLE), or suspended from the upper deck in the cabin. Then the head of the vessel is kept by the helm in such a direction as to make any required angle with the line of the needle, or the person (in mining or travelling) advances in a similar manner. Thus, supposing that a vessel sets out from a certain part, in order to go to another place that is exactly westward of the former; as for example, from the Land's End in Cornwall to Newfoundland on the coast of North America. The vessel must be directed in such a way, as that its course may be always at right angles with the direction of the magnetic needle, or so that the part of the needle or compass card, which points to the northward, (allowing for the variation) may be always kept to the right hand of the man at the helm, or to the starboard side of the vessel. The reason of this is evident; for, supposing the needle to point duly north and south, the direction of east and west being perpendicular to it, this must be the true course of the vessel. From this example, a little reflection will easily point out how a vessel may be steered in any in other course (A).

20 Polarity disturbed by the approach of iron.

The declination of the magnetic needle is disturbed by the near approach of a ferruginous body, especially if this be of considerable size.

On holding the extremity of a pretty large iron rod, such as a poker, near one end of a magnetic needle properly suspended, the needle will be found to turn considerably from its usual direction. This circumstance, though proper to be mentioned here, will be better understood when we have considered the attractive power of the magnet. The fact is useful, as it teaches us to keep magnetic needles in such a situation as not to be acted on by any considerably body of iron.

A magnet, whether natural or artificial, has a greater effect in disturbing the polarity of a magnetic needle than is produced by iron.

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Magnetic polarity seems also to be affected by changes in the state of the atmosphere; and the following axioms respecting this effect on the declination of the needle, collected by M. la Cotte, are deserving of attention.

1. The greatest declination of the needle from the north towards the west, takes place about two in the afternoon; and the greatest approximation of it towards the north, about eight in the morning; so that from the last-mentioned hour till about two in the afternoon, it endeavours to remove from the north, and between two in the afternoon and the next morning, to approach it.

2. The annual progress of the magnetic needle is as follows:—Between January and March, it removes from the north; between March and May it approaches it; in June it is stationary; in July it removes from it; in August, September, and October it approaches it; its declination in October is the same as in May; in November and December it removes from the north; its greatest western declination is at the vernal equinox, and its greatest approximation to the north, at the autumnal equinox.

3. The declination of the magnetic needle is different, according to the latitude; among us, (i. e. in France) it has always increased since 1657; before that period it was easterly.

4. Before volcanic eruptions and earthquakes, the magnetic needle is often subject to very extraordinary movements.

5. The magnetic needle is agitated before and after the appearance of the northern lights: its declination on these occasions is about noon greater than usual.

So much has already been said respecting the phenomena, &c. of the dipping needle, under the article *DIPPING Needle*, that it is unnecessary here to add much more on the subject. It was there noticed, that at the equator the dipping needle lies quite horizontal, and that one of its extremities inclines more towards the earth, according as the instrument is carried farther from the equator. We may here add, that from some late observations made by experimentalists with balloons, it appears that the higher we ascend above the surface

(A) In reply to some inquiries respecting the mode of employing the compass in mining, we were favoured by an ingenious friend, who is manager of one of the most extensive coalworks in this island, with the following remarks: "The compass is used in all mines where great accuracy is required. In some coal-mines the *cleats* or *faces* of the coal are the guides to the miners in excavating the mine, and the compass is used to ascertain the situation and extent of the excavations. In other coal-mines the courses of the excavations are at first directed by the compass. In doing this, the compass is placed in a given situation, and is made to point the desired course. Then from the centre of one sight a perpendicular line is conveyed to the roof of the mine, and a small mark is there made with chalk; then a person looks at a candle (placed so as nearly to touch the roof), through the lower part of the sight of the compass nearest to him, and through the upper part of the opposite sight. The candle at the roof is moved in any direction until he sees it through both sights of the compass. It is then in a proper place, and a chalk mark is made in the roof immediately above it. A line struck with a chalked cord, between these two marks upon the roof, marks the proper course, by which the workmen are directed in making the excavation. By applying one part of a chalked cord along part of the course or white line thus begun on the roof, and extending the other part of the cord past it to any required distance, and then striking the cord, the course may be continued from time to time as the excavation advances."

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surface of the earth, the less is the angle of inclination which the dipping needle makes with the horizontal line *.

* *Nichols. Jour.* 8vo. xi. p. 54.

It is worthy of remark that, under the same circumstances, the declination of the needle was not found different from what it would have been on the earth at the same place, and its polarity with respect to iron was unchanged.

In an aërostatic voyage made at St Petersburgh in 1804 by M. M. Sacharof and Robertson, it was observed that the *south* pole of a magnetic needle, balanced on a pin, dipped below the horizon nearly 10 degrees.

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The following table shows the magnetic dip as observed at several different places at various times.

Latitude.	*Longitude.*	*N. Pole below the Horizon.*	*Years of Observation.*	*Latitude.*	*Longitude.*	*N. Pole below the Horizon.*	*Years of Observation.*
North.	East.			South.			
53° 55′	193° 39′	69° 10′	1778	0° 3′	27° 38′	30° 3′	
49 36	233 10	72 29		4 40	30 34	22 15	
	West.			7 3	33 21	17 57	
44 5	8 10	71 34	1776	11 25	34 24	9 15	
38 53	12 1	70 30			East.	*S. Pole below.*	
34 57	14 8	66 12		16 45	208 12	29 28	
29 18	16 7	62 17		19 28	204 11	41 0	
24 24	18 11	59 0		21 8	185 0	39 1	1777
20 47	19 36	56 15		35 55	18 20	45 37	1774
15 8	23 38	51 0		41 5	174 13	63 49	1777
12 1	23 35	48 26		45 47	166 18	70 3	1773
10 0	22 52	44 12		Prince of Wales's Island.		5 10	1799
5 2	20 10	37 25					

Table of the Magnetic Dip at London from 1786 *to* 1805.*

* *Phil. Trans.* 1806. p. 491.

	Poles Reversed.				
	Face east.	Face west.	Face east.	Face west.	True dip.
1786 September	72 28,7	72 1,4	71 57,3	72 5,1	72 8,1
October	72 29,9	71 59,0	72 0,4	72 1,2	72 7,6
November	72 7,6	72 17,6	72 2,4	71 46,7	72 3,6
December	72 10,6	72 2,2	72 2,2	71 58,4	72 3,4
1787 January	72 11,4	72 1,8	72 1,0	71 56,0	72 2,5
February	72 19,4	72 10,8	72 1,5	71 55,8	72 6,9
March	72 19,1	72 11,9	72 0,5	71 52,2	72 5,9
April	72 24,4	72 9,5	72 0,5	71 52,2	72 6,6
May	72 24,4	72 9,6	72 4,2	71 52,9	72 7,8
June	72 22,6	72 7,9	72 4,2	71 52,9	72 6,8
July	72 22,6	72 7,9	71 59,9	71 55,1	72 6,4
August	72 22,3	72 6,7	72 59,3	71 55,2	72 5,9
September	72 22,3	72 6,7	72 2,9	71 51,0	72 5,7
October	72 23,1	72 2,5	72 2,9	71 51,0	72 4,9
November	72 23,1	72 2,5	72 2,7	71 50,3	72 4,7
December	72 22,8	72 2,0	72 2,7	71 50,3	72 4,4
1788 January	72 22,8	72 2,0	72 2,6	71 48,8	72 4,0
1789 January	72 16,0	72 0,0	71 51,9	71 31,1	71 54,8
December	72 17,5	71 59,4	71 38,9	71 42,8	71 54,6
1790 January	72 16,9	71 57,7	71 40,2	71 40,2	71 53,7
1791 January	71 43,9	71 36,1	71 37,2	71 17,5	71 23,7
1795 October	71 12,8	71 9,5	71 13,9	71 9,4	71 11,4
1797 October	71 4,9	71 10,9	70 56,3	70 44,7	70 59,2
1798 April	71 4,7	71 14,5	71 2,3	70 19,8	70 55,4
October	70 55,6	71 14,5	71 7,7	70 22,2	70 55,0
1799 October	70 56,0	71 13,5	71 11,5	70 7,9	70 52,2
1801 April	70 47,4	71 5,6	70 52,4	69 38,2	70 35,6
1803 October	70 30,9	71 9,9	70 40,5	69 46,7	70 32,0
1805 August	70 25,2	70 55,7	70 26,9	69 36,3	70 21,0

Experimental Illustrations.

To what was said under *Dipping Needle*, respecting the construction of that instrument, we may add, that notwithstanding the great improvements that have been lately made in the arts, the making of a dipping needle is one of the most delicate and difficult tasks that an instrument-maker can undertake. The needle must be made of tempered steel which we are certain has no magnetism before it is touched; it must be poised so nicely, and with such a perfect coincidence of its centre of gravity and axis of motion, that it will retain any position (before being magnetised) that is given it. A good dipping needle cannot be had below *twenty guineas*.

Sect. II. *On Magnetic Attraction and Repulsion.*

22 A magnet attracts iron and all ferruginous bodies.

A magnet attracts iron, and all bodies, into the composition of which iron enters in any considerable degree. This principle is illustrated by very simple experiments, which will readily occur to every reader. It is of consequence here to observe, that the purer and softer the iron to which the magnet is presented, the stronger will be the attraction; thus, a magnet attracts a piece of soft and clean iron much more strongly than it attracts any other ferruginous body of the same shape and weight. Hard steel, or the harder ores of iron, are less forcibly attracted than soft steel, and still less than soft iron; and all pieces of iron are less forcibly attracted in proportion as they are oxygenated.

[22] Attraction greatest at the poles.

The attractive power of a magnet is not equally strong in every part of its surface. It is most powerful at the poles of the magnet, and it is found to diminish in proportion as the part of the surface is more distant from the poles. Thus, in an oblong magnet, the attraction is least at about its middle, where it is often very trifling.

23 Method of finding the poles of a magnet.

It is by this property of the magnet that we are enabled to discover the poles of a magnet, where they are not yet ascertained; a circumstance which is often necessary with respect to natural magnets, in which, when of an irregular shape, it would otherwise be difficult to discover the poles. The usual method of ascertaining the poles of a magnetic body is, to present various parts of the body to be examined, successively to the poles of a magnetic needle, when it will soon be discovered which parts of the body have most influence on the needle, by the pole of the latter standing perpendicularly to that part of the body. It will presently appear, that in this way it may also be ascertained which of these poles is the north, and which the south, as the south pole of the body under examination will have most influence on the north pole of the needle, and *vice versa*.

A good magnet should have no more than two poles, and these should be situated in the extreme surface of the magnet; but it sometimes happens, especially in natural magnets, and in artificial magnetic bars, if they be very long, that there are more than two poles, or that the poles are very confused. For example, in a very long magnetised bar, there may be a strong north pole at one extremity, a south pole a little farther on, then a weaker north pole, and so on to the extremity, which will be found possessed of a still weaker south polarity. These poles are to be discovered by presenting to several parts of the bar one or other of the poles of a magnetic needle; for, as we shall immediately mention, each pole of the needle will be attracted towards that part of the rod which is possessed of the contrary polarity. Experimental Illustrations.

The attractive power of the magnet and the iron is most forcible when the two bodies are in contact, and it diminishes as they are made to recede from each other. The exact law according to which this diminution takes place, has not yet been completely ascertained. We shall see in the next chapter, what approximation has been made to it.

24 Different attractive power of magnets.

A magnet is not capable of lifting above a certain weight of iron; and all magnets of the same form and size are not able to lift the same weight. Among the natural magnets the smallest seem in general to possess a greater attractive power in proportion to their size, than those of larger dimensions. Mr Cavallo mentions a small magnet that weighed not more than 6 or 7 grains, and was capable of lifting about 300 grains; and Sir Isaac Newton possessed a magnet that he wore in a ring, weighing but about 3 grains, which is said to have lifted 746 grains, or nearly 250 times its own weight. The larger natural magnets are very weak in proportion to these. Those of two pounds scarcely lift more than ten times their own weight. It seems extraordinary, that a piece cut off from a large magnet is sometimes much stronger in respect of its attractive power, than the magnet from which it was taken.

It has been said that the attractive power of magnets is greatest at their poles. Both poles, however, are seldom equal in this respect; and it appears, that in these nothern parts of the world, the northern pole of magnets is more powerful than the south. In the southern hemisphere the contrary effect is said to take place. The attractive power of the magnet is most forcible when both poles are made to act conjunctly; hence an armed magnet, or one of the horse-shoe form, is best adapted for experiments on the force of magnetic attraction.

It is of little consequence whether the iron that is presented to the magnet be in one piece, or consist of several pieces. The attraction is indeed stronger in the former case; but if several pieces of iron are presented to the magnet, they will either all adhere about the pole of the magnet, or will adhere to each other, so as to form a sort of chain. If a small iron ball be made to adhere to the pole of a magnet, this ball will support a second; and this latter, if the magnet be pretty strong, will support a third. If the magnet be of the horse-shoe form, and have these three balls hanging by one ball, if two others be suspended from the other pole, all the five may be made to adhere, so as to form a curved chain. It will be evident, that pieces of iron which present a greater extent of surface than the above spherical balls, will be more powerfully attracted.

26 Action of a magnet on iron filings.

One of the most pleasing experiments on the attraction of the magnet for iron, is shewn by means of iron filings.

Exper.—Let a paper be placed above a bar magnet, and let iron filings be shaken on the paper through a gause sieve. They will arrange themselves round the magnet in a very beautiful manner, forming curves and arches of curves, as represented in fig. 6. At the two ends of the magnet, as *a a*, there are chains of filings standing out nearly perpendicular; and along the sides they Fig 6.

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they form complete curves, bending outwards away from the magnet towards its middle, and having their extremities bounded by the poles of the magnet; and at the corners there are a number of arches that seem to form imperfect curves.

A similar effect may be produced by strewing iron filings on a piece of paper, so as to leave a vacancy in the middle, capable of receiving a bar magnet. When the magnet is placed on the paper, and the paper gently tapped, so as to agitate the filings, these will arrange themselves about the magnet, in curves, as above described.

The form of these curves will be better defined if the magnet be laid at the bottom of an earthen or glass vessel of water, and the iron filings be sifted over it so as to pass through the water.

27 Attraction between the magnet and iron mutual.

The attraction between a magnet and a ferruginous body is mutual.

Exper.—Place a piece of iron or other ferruginous body upon a piece of cork or wood, so that it may float on the surface of water in an earthen or wooden vessel. Bring a magnet within a moderate distance of the floating body, and the latter will approach the former, and may be drawn by it in any direction. Again, place the magnet on cork or wood, so as to float on the water, and present to it a piece of iron or other ferruginous body. The magnet will now approach the iron, and may be drawn by it as the iron was before. Lastly, Place both the magnet and the iron on separate pieces of wood or cork, within a moderate distance of each other, on the surface of the water. They will gradually approach each other, with a velocity that becomes greater in proportion as they approach nearer each other.

28 Magnetic attraction not sensibly lessened by the interposition of bodies not ferruginous.

Magnetic attraction is not sensibly impeded by the interposition of bodies of any kind, that do not contain iron in their composition.

Exper.—Suppose that a magnet, placed at the distance of an inch from a piece of iron, exerts a certain degree of attraction, it will be found that the attraction is not sensibly weakened by the interposition of a plate of glass, a sheet of paper, a piece of copper, or any other similar substance. A needle, inclosed in a glass globe, will be still attracted by the magnet.

29 Usual mode of measuring the attractive force.

It is not easy to ascertain correctly the degree of attractive force exerted between a magnet and a ferruginous body. The usual method of observing this is, to fasten a magnet to one arm of a balance, and placing the body to be attracted at different distances below the magnet, to counterpoise the attraction with weights placed in the opposite scale of the balance. Proceeding in this way, then, if we find that it requires the weight of an ounce to counterpoise the attractive power of a magnet, when presented immediately to a piece of iron, it will be found that it requires the same counterpoise, if a plate of any matter that is not ferruginous be interposed.

30 Iron attracts iron in certain situations.

Not only is iron attracted by the magnet, but *under certain circumstances, one piece of iron exerts an attractive power on another piece of iron.*

Exper.—Let an oblong piece of iron be fixed in a spherical piece of wood or cork, so as to float in water in the true magnetic line, as in Exper. 2. of N° 16. When the iron is nearly in the magnetical position, bring the extremity of a large iron rod, as the point of a new poker, holding it in a position not very different from that of the iron wire, within about a quarter of an inch of the upper extremity of the floating iron, and hold it there for some time, a little towards one side. The floating wire will gradually approach the iron rod with an accelerated motion, will at length touch it, and may be drawn through the water in any direction. A similar attraction will take place between the head of the poker and the extremity of the wire that is below the water.

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31 Magnetic attraction increased by iron.

The attractive power of the magnet is increased by the near approach of a piece of iron.

Exper. 1.—Suppose we have a magnetic bar that is capable of supporting a small key by one of its extremities, but which will not lift a key somewhat larger. If we bring a considerable oblong piece of iron near the opposite extremity of the bar, it will be found capable of supporting the larger key, or at least of lifting a weight somewhat greater than it sustained before.

Exper. 2.—Let an oblong magnetic bar be supported in a horizontal position, and let a piece of iron wire, about an inch in length, be hung by a short thread, so that its extremity is just opposite one of the poles of the magnetic bar, but so far out of the reach of the bar's attractive power as not to be brought from the perpendicular. Now, if a considerable iron bar be brought with one end within a moderate distance of the opposite pole of the magnet, the suspended wire will be drawn towards the magnet, thus shewing that the power of the latter has been increased by the juxtaposition of the bar of iron. If the bar of iron be brought still nearer the opposite pole of the magnet, the suspended wire will be drawn still nearer its adjacent pole; but if the bar of iron be drawn back from the magnet, the wire will fall into its original position.

This fact leads to many important practical conclusions in the management of magnets. As the juxtaposition of iron to the *poles* of a magnet improves its powers, we may infer, that if we keep a piece of soft iron in contact with the poles, the magnet will be improved by it; and this is in fact the case, and it shews the utility of the armature and conductor mentioned in N° 13. But of this more hereafter.

32 Power of a magnet increased by hanging weights to it.

The attractive power of a magnet may be improved by increasing the weight appended to it.

This is best shown by a horse-shoe magnet, having a conductor of soft iron attached to its two poles, and a brass ring at the convex part by which it may be suspended. If a small bag be hung to the conductor, and if the magnet is capable of sustaining a certain weight at any particular time, it will, by adding a little more, suppose a few shot, to the bag, at moderate intervals, be made to support gradually a much greater weight. If the magnet, on a first trial, was able to lift a small key, it will soon be able to lift a larger one, &c. How far this increase of power may be carried, has not, we believe, yet been ascertained.

It sometimes happens that a magnet does not shew any great attractive power, as exemplified in its power of lifting a considerable weight of iron, though it may have a great effect in exciting or in altering magnetic polarity. This was observed by Dr Gilbert, who re-

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marks that the *directive* power of a magnet extends *farther* than its *attractive* power.

33 Contrary poles of magnets attract each other.

The contrary poles of two magnets attract each other; that is, the north the south, and vice versa.

Exper. 1.—Place two oblong magnets on cork or wood, so as to float in water, or suspend each by a pretty long thread, with the north pole of the one opposed to the south pole of the other. They will gradually approach, and will at length rush together.

A similar effect will be produced, if the north pole of a bar magnet be held near the south pole of a magnetic needle; the latter will be attracted, and the same thing will happen if the south pole of the bar is brought near the north pole of the needle.

Exper. 2.—Take two semicircular magnets, and dip their extremities into iron filings. The filings will of course adhere to the extremities of the magnets, and will appear as if radiating from them. Now, present the two magnets with their adhering filings to each other, so that the north and south pole of the one is opposite to the contrary poles of the other, and the iron filings at their extremities will approach each other, and coalesce, as represented in fig. 7.

Fig. 7.

The attraction exerted between two magnets is not so strong in proportion, as between a magnet and a piece of soft iron in contact; but it has been found to commence at a greater distance.

34 Corresponding poles repel each other.

The corresponding poles of two magnets repel each other; that is, the north the north, and the south the south.

Exper. 1.—Make the two magnets float on water, or suspend them by threads, so that the north or south pole of the one may be opposite to the north or south pole of the other. They will recede from each other; and the repulsion will evidently be greater, in proportion as they are brought nearer together.

Exper. 2.—Take two semicircular magnets, and dip their ends in iron filings, as mentioned above. Present them to each other, so that their corresponding poles may be mutually opposed. The filings at their extremities will start back, and leave a vacancy between the opposed poles of the magnets, somewhat like what is represented in fig. 8.

Fig. 8.

It sometimes happens that the corresponding poles of two magnets do not repel each other, but either mutually attract, or are quite indifferent. In this case, it will, in general, be found that one of them is stronger than the other; and the reason of the phenomenon will appear hereafter.

The repulsive power of a magnet is generally in a less proportion than its attractive power.

35 Usual mode of ascertaining whether a body is magnetic.

It is by the attractive power of the magnet that we usually ascertain whether any substance be magnetic; that is, whether the magnet possess any attractive power for it. If the body contain any considerable quantity of iron in its composition, its magnetism is easily ascertained, by approaching it with the pole of a pretty strong magnetic bar. If, however, the magnetism is too feeble to be discovered in this way, it may be ascertained by placing the body on a piece of cork or wood, so that it may float on the surface of water or mercury, in an earthen or wooden vessel, and bringing the pole of the magnet within a small distance of the floating body. It will sometimes be necessary to bring the magnet within one-tenth of an inch of the body, when, if it possesses any magnetism, it will gradually approach the magnet. This experiment is most satisfactory when the body to be examined is made to float on mercury; but in that case the vessel containing the mercury must not be too small, otherwise the natural convexity of the surface of the mercury will cause the floating body perpetually to fall down towards the sides of the vessel. A common soup plate will answer the purpose very well. It is also necessary that the mercury be very pure, and as clean as possible. To insure this, it will be proper, before using the mercury, to pass it through a conical piece of writing paper, rolled up so as to terminate in a very small aperture; or, what is better, to squeeze it through a pretty thick piece of shamois leather. It need scarcely be remarked, that in these delicate experiments, the air of the room should be kept as still as possible.

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By the above methods, Mr Cavallo and others discovered, that the following substances are in some measure affected by the magnet. Most metallic ores, especially after their having been exposed to a fire; zinc, bismuth, and particularly cobalt, as well as their ores, are almost always attracted. Of the earths, the calcareous is the least, if at all, and the siliceous is the most frequently, attracted. The ruby, the chrysolite, and the tourmalin, are attracted. The emerald, and particularly the garnet, are not only attracted, but frequently acquire a permanent polarity. The opal is weakly attracted, especially after combustion. Most animal and vegetable substances, after combustion, are attracted. Even soot, and the dust which usually falls upon whatever is left exposed to the atmosphere, are sensibly attracted by the magnet.

36 Coulomb's experiments on universal magnetism.

"It has long ago been remarked, that platina, nickel, and several other bodies, acquire a sensible degree of magnetism; but some philosophers attribute this property only to a portion of iron not easy to be separated, and conclude, that by obtaining a greater degree of purity, we might succeed in rendering them perfectly indifferent to the action of the magnetic bar.

"The new experiments which Citizen Coulomb has made and repeated before the Institute, lead us on the contrary to think, that the action of magnetism extends through all nature; for none of the bodies he has yet tried was found to resist this power.

"But however real this action may be, it is not alike in all bodies, and in most of them it must be necessarily very small, to have escaped the attention of philosophers to this time. In order therefore to exhibit and to measure these results, we must begin by placing the bodies in a situation which shall allow them to yield to the weakest action.

"For this purpose, Citizen Coulomb fashioned his subjects into the form of a cylinder or small bar; and in this state he suspended them to a silken thread, such as is drawn from the silk-worm's cone, and in this state he placed them between the opposite poles of two magnetic bars of steel. The single thread of silk could hardly bear the weight of a quarter of an ounce without breaking, consequently it became necessary to form small bars very light and thin. Citizen Coulomb made them about seven or eight millimetres in length (or less than half an inch), with three-fourths of a millimetre

(or

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(or about an hundredth part of an inch) in thickness, and he gave the metals about one-third of this thickness.

"In his experiments he placed the steel bars in the same right line, their opposite poles being five or six millimètres farther asunder than the length of the needle intended to oscillate between them. The result of the experiment shewed, that whatever might be the substance of the needle, it always disposed itself according to the direction of the two bars; and that if they were turned from this direction, they always recovered it, after oscillations of which the number was often more than 30 per minute. It was therefore easy in every case to determine, from the weight and figure of the needle, the force which had produced the oscillation.

"These experiments were successfully made with small needles of gold, silver, copper, lead, tin, small cylinders of glass, a piece of chalk, a fragment of bone, and different kinds of wood.

"Citizen Coulomb has proved, that the force of torsion of the silk thread is so slight, that in order to draw it round the entire circle, it would require a force scarcely equal to the one hundred thousandth part of a gramm, (or about one seven hundredth part of a grain). A quantity so minute cannot therefore sensibly derange the measure of magnetic force in the different bodies; and its effect, even if it were admitted to be of perceptible magnitude, may also be urged in proof of the general conclusion of Citizen Coulomb, because the magnetic power must overcome this resistance of the thread in order to manifest itself. Our author gives, in the third volume of the Memoirs of Natural Philosophy and Mathematics of the National Institute, a very simple formula to determine the magnetic force of a body from the time of its oscillations; and he means to shew in another memoir, the method of determining this result in different bodies of the same figure placed between the poles of two bars. He thinks it now proved, that all the elements which enter into the composition of our globe are subjected to the magnetic power, and that the whole mass collectively forms one single magnet.

"In favour of those who might be desirous of repeating his experiments, and rendering them very sensible, the author remarks, that the method of succeeding consists in diminishing the size of the oscillating bodies. From some essays, of which the results terminate this memoir, it seems to follow, that the accelerating forces are inversely as the masses, or very nearly in the direct proportion of the surfaces; but Citizen Coulomb gives this rule only as a first deduction, which requires to be confirmed*."

* *Nichol. Journ.* 8vo. vol. ii.

The opinion of the general influence of magnetism on all terrestrial bodies was, as we shall see hereafter, maintained by our countryman Dr Gilbert, though Coulomb has certainly the merit of having put it to the test of experiment.

37 Entertaining experiments.

Besides the experiments which we have related, there are some that depend on the attractive power of the magnet, and which are ranked among scientific amusements. We shall here describe a few of these.

Before we relate the manner of making these experiments, it may be proper to describe an instrument that is employed in some of them. This, from its form and apparent use, is called the magnetic perspective glass, and is thus constructed.

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Construction of the magnetic perspective glass. Fig. 9.

Provide an ivory tube about 2½ inches long, and of such a form as is expressed in fig. 9. The sides of this tube must be so thin as to admit a considerable quantity of light. It is to open at one end with a screw, and at that end must be placed an eye-glass of about two inches focus, and at the other end any glass you please. Have a small magnetic needle like that in a compass. It must be strongly touched, and so placed at the bottom of the tube that it may turn freely round. It is to be fixed on the centre of a small ivory circle C, of the thickness of a counter, placed on the object-glass D, and painted black on the side next it. This circle must be kept fast by a circular rim of pasteboard, that the needle may not rise off its pivot, in the same manner as in the compass. This tube will thus become a kind of compass sufficiently transparent to show the motions of the needle. The eye-glass serves more clearly to distinguish the direction of the needle, and the glass at the other end, merely to give the tube the appearance of a common perspective glass. It will appear, from what has been already stated, that the needle in this tube, when placed over and at a small distance from a magnet, or any machine in which it is contained, will necessarily place itself in a position directed by that magnet, and consequently show where the north and south pole of it is placed; the north end of the needle constantly pointing to the south end of the magnet. This effect will take place, though the magnet be enclosed in a case of wood, or even metal. You must observe, however, that the attracting magnet must not be very far distant from the needle, especially if it be small, as in that case its influence extends but to a short distance. This tube may be differently constructed, by placing the needle in a perpendicular direction, on a small axis of iron, on which it must turn quite freely, between two small plates of brass placed on each side of the tube; the two ends of the needle should be in exact equilibrium. The north and south ends of the needle will, in like manner, be attracted by the south and north ends of the magnetic bar. The former construction, however, appears preferable, as it is more easily excited, and the situation of the needle much more easily distinguished.

Exp. 1. *The Communicative Piece of Money.*

39 Communicative piece of money.

Take a crown or dollar, and drill a hole in the side of it, in which place a piece of wire, or a large needle well polished, and strongly touched with a magnet. Then close the hole with a small piece of pewter, that it may not be perceived. Now, the needle in the magnetic perspective before described, when it is brought near to this piece of money, will fix itself in a direction corresponding to the wire or needle in that place. Desire any person to lend you a crown piece or dollar, which you dexterously change for one that you have prepared as above. Then give the latter piece to another person, and leave him at liberty either to put it privately in a snuff-box, or not; he is then to place the box on a table, and you are to tell him by means of your glass, whether the crown is or is not in the box. Then bringing your perspective close to the box, you will know, by the motion of the needle, whether it be there or not; for as the needle in the perspective will always

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always keep to the north of itself, if you do not perceive it has any motion, you conclude the crown is not in the box. It may happen, however, that the wire in the crown may be placed to the north, in which case you will be deceived. Therefore, to be sure of success, when you find the needle in the perspective remain stationary, you may, on some pretence desire the person to move the box into another position, by which you will certainly know whether the crown-piece be there or not. You must remember that the needle in the perspective must here be very sensible, as the wire in the crown cannot possibly have any great attractive force.

Exp. 2. *The Magnetic Table.*

40 Magnetic table.

Under the top of a common table place a magnet that turns on a pivot, and fix a board under it, that nothing may appear. There may also be a drawer under the table, which you pull out to shew that there is nothing concealed. At one end of the table there must be a pin that communicates with the magnet, and by which it may be placed in different positions; this pin must be so placed as not to be visible to the spectators. Strew some steel filings or very small nails over that part of the table where the magnet is. Then ask any one to lend you a knife or a key, which will then attract part of the nails or filings. Then placing your hand in a careless manner on the pin at the end of the table, you alter the position of the magnet, and giving the key to any person, you desire him to make the experiment, which he will then not be able to perform. You then give the key to another person, at the same time placing the magnet, by means of the pin, in the first position, when that person will immediately perform the experiment.

Exp. 3. *The Mysterious Watch.*

41 Mysterious watch.

You desire any one in company who has a watch with a steel balance (B), to lend it you for a few minutes, asking him whether it will continue to go when laid on the table. He will probably say it will. To prove to him that he is wrong, you lay it on that part of the table below which you have previously placed a strong bar-magnet (as in Exp. 2.), so that the watch may be above one of the poles. It will immediately stop. Now, if you shift the position of the magnet, and give the watch to another person to lay it on the table, it will not stop; but replacing the magnet, and desiring a third person to try the experiment, he will succeed. All this, to those who are not acquainted with the secret, will appear very extraordinary.

Exp. 4. *The Magnetic Dial.*

42 Magnetic dial. Fig. 10. and 11.

Provide a circle of wood or ivory, of about five or six inches diameter, as fig. 10. which must turn quite free on the stand B (fig. 11.), in the circular border A: on the circle must be placed the dial of pasteboard C (fig. 10.), whose circumference is to be divided into 12 equal parts, in which must be inscribed the numbers from 1 to 12, as on a common dial. There must be a small groove in the circular frame D, to receive the pasteboard circle; and observe that the dial must be made to turn so freely that it may go round without moving the circular border in which it is placed. Between the pasteboard circle and the bottom of the frame, place a small artificial magnet E (fig. 12.) that has a hole in its middle, or a small protuberance. On the outside of the frame place a small pin P, which serves to shew where the magnetic needle I, that is placed on a pivot at the centre of the dial, is to stop. This needle must turn quite freely on its pivot, and its two sides should be in exact equilibrium. Then provide a small bag, that has five or six divisions, like a lady's work-bag, but smaller. In one of these divisions put small square pieces of pasteboard on which are written the numbers from 1 to 12, and if you please you may put several of each number. In each of the other divisions you must put 12 or more like pieces, observing, that all the pieces in each division must be marked with the same number. Now the needle being placed upon its pivot, and turned quickly about, it will necessarily stop at that point where the north end of the magnetic bar is placed, and which you previously knew by the situation of the small pin in the circular border. You therefore present to any person that division of the bag which contains the several pieces on which is written the number opposite to the north end of the bar, and tell him to draw any one of them he pleases. Then placing the needle on the pivot, you turn it quickly about, and it will necessarily stop, as we have already said, at that particular number.

Experimental Illustrations. Fig. 12.

Another experiment may be made with the same dial, by desiring two persons to draw each of them one number out of two different divisions of the bag; and if their numbers, when added together, exceed 12, the needle or index will stop at the number they exceed it; but if they do not amount to 12, the index will stop at the sum of those two numbers. In order to perform this experiment, you must place the pin against the number 5, if the two numbers to be drawn from the bag be 10 and 7; or against 9, if they be seven and two. If this experiment be made immediately after the former, as it easily may, by dexterously moving the pin, it will appear the more extraordinary.

Exp. 5. *The Divining Circles.*

43 Divining circles. Fig. 13.

On the top of a thin box, as AB fig. 13. paste two circles drawn on paper, as F, G, each of which is divided into compartments. In those of one circle, as G, are written questions, and in those of the other, as F, appropriate answers. Through the centre of the circle G an axle passes, carrying a toothed wheel, and which works into the pinion *d*, to the axis of which is fixed another pinion, and this receives the teeth of another wheel *g*, whose axis is passed through the centre of the circle F. On the axis of the wheel *c* is to be fixed an index *a* above the paper circle, and to the axis of the wheel *g*, just below the cover of the box, is fixed a bar magnet *q q*, turning together with the axis; while on the part of the axis that projects above the circle F a loose needle *x x* is balanced, so as to move independently of the axis. A carton of strong paper, of the size of

(B) The balance of a watch is sometimes, though very seldom, made of brass, when it is scarcely susceptible of magnetic influence.

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of F should cover the pasted circle, and turn easily on the centre ♈; and it should have a triangular piece as F cut out, in order to see the answers. If now the needle be taken off its point, and a person be desired to ask some of the questions on the circle G, the index must be turned to the question, and then the needle placed on its pivot, giving it a whirl round. When it stops, its point will stand over the proper answer, which may be seen by turning the open part of the carton to that place.

Sect. III. *Of the Communication and Production of Magnetism.*

The whole of this important part of the subject may be said to depend on one general fact, which we shall therefore first lay down and illustrate.

44 Iron becomes magnetical by proximity to a magnet.

Any piece of iron when in the neighbourhood of a magnet, is itself a magnet, and possesses all the material properties of that body.

Exp. 1.—Let there be a large and strong magnet properly supported in the horizontal direction, at a distance from iron or other similar bodies, and with its poles perfectly free. Take also any small piece of common iron, not more than two or three inches long, such as a common small key, and take another piece of iron, as a smaller key, or short piece of wire about the size of a goose quill.

In the first place hold the key in a horizontal position, with one end opposite one of the poles of the magnet, but so as not to be in contact with it. Then bring the other piece of iron to the other end of the key, and it will hang by the key, and will so continue to hang, though we withdraw the key from the magnet horizontally, till there is a certain interval between the key and the magnet, when the former will be no longer able to support the piece of iron. Even at this distance the key will, however, be found capable of supporting a piece of iron considerably smaller than the former, till its distance from the magnet is increased.

Again, hold the key with one extremity below one of the poles of the magnet, and touch the other extremity with the small piece of iron, the latter will adhere till the key be removed too far below the magnet.

Thirdly, Hold the key with one of its extremities above one of the poles of the magnet, but at such a distance that there is room for the small piece of iron to go between the key and the magnet, without touching the latter. The piece of iron will be supported by the key, as in the two former instances.

Fourthly, Let the magnet be placed in a vertical position, and hold the key with one extremity immediately below or above one of the poles. The piece of iron will be supported in a similar manner, in the former case by the extremity of the key that is most remote from the magnet, and in the latter by that which is adjacent.

If, instead of approaching the magnet with the key, we reverse the circumstances, the effect of the magnet in rendering the key magnetical will be still more evident. Suppose the piece of iron to be lying on the table; let one end of it be touched with the key, and there will be found no attraction between them: but if while we hold the key very near one extremity of the wire, we bring the pole of the magnet near the other end of the key, we shall see the wire rise from the table, and adhere to the key.

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In all these cases the attractive power of the key, that is, its magnetism, is evidently derived from its juxtaposition to the magnet.

Exp. 2.—Let two pieces of iron be suspended by separate ends of a piece of thread, so that they may be hung from a pin in the wall in a situation parallel to each other, or in contact. Now bring one end of a bar magnet a little below the wires, and they will repel each other. If these wires are of soft iron, they will collapse immediately on the magnet being withdrawn; but if they are formed of hard iron or of steel, they will continue apart for a considerable time.

Here the two wires are, by the proximity of the magnet, become magnets, and the extremities next the bar have each acquired a similar polarity, i. e. both contrary to that of the adjacent pole of the bar. They, therefore, repel each other.

Exp. 3.—Let a bar-magnet, such as N, S, fig. 14. be laid in a horizontal position, and let a small key, as B, C, be held near the north pole of the magnet, in the direction of its axis. Let a very small magnetic needle, supported on a sharp pivot, be brought near that end of the key C, which is most remote from N. The needle will immediately turn its south pole towards C, as is indicated by the feathered part of the arrow *c*. Hence it appears that the key has acquired a directive power like a magnet, and that its remote extremity performs the office of a north pole, as it attracts the south pole of the needle, and repels its north pole. If it be said that the magnetic needle in this case is affected directly by the directive power of the magnet, as it would take the above position though the key were not present; to shew that the effect is produced through the medium of the key, remove the needle into another situation as *b*, and it will still arrange itself with the same pole opposite C, and if it be carried to the proximate extremity of the key, as at *a*, it will turn round, and present its north pole to B, thus shewing that it is, at least in some measure, influenced by the key. Fig. 14.

45 Nearest end acquires a polarity contrary to that of the adjacent pole of the magnet.

In general, when a piece of iron is presented to the pole of a magnet, the extremity next that pole is possessed of the contrary polarity, and the remote extremity has acquired a similar polarity. The situation of the poles, however, depends much on the form of the piece of iron, and on the part of its surface which is presented to the pole of the magnet. If the form be that of an oblong bar, one extremity of which is presented to the pole, which is the most usual case, the circumstances will be as we have just mentioned. If the oblong bar be presented to the pole in a perpendicular direction, with its middle very near the pole of the magnet, this middle point will be possessed of a polarity contrary to that of the adjacent pole, while the two extremities have acquired the same polarity. If the presented iron be in the form of a circular plate, and its centre be held near the pole of the magnet, this centre will have the contrary polarity, and every point of the circumference the same polarity. If the plate have its circumference fashioned into points, each of these points will acquire a very strong polarity, contrary to that of the pole near which the centre of the plate is held.

The communication of magnetic power from the magnet

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magnet to the key in the foregoing experiments, will be still more strongly illustrated by holding another piece of wire to the wire that is already suspended by the key. The new piece of wire will also be suspended, and so several more may be suspended by one another, like the links of a chain, according to the strength of the magnet. This fact was known to the ancients, who speak of a loadstone causing an iron ring to carry another ring; and that a third, till the whole puts on the appearance of a chain.

46 Induced magnetism.

It will be found that the magnet has lost none of its power by producing magnetism in the iron, and of course, that nothing has been *transferred* from the magnet to the iron. The magnetism of the iron thus caused by its juxtaposition to a magnet is called *induced magnetism*, or *magnetism by induction*.

47 Apparent exception.

There is an apparent exception to the universality of the above proposition. If the key be held in such a position as that it shall be perpendicular to the magnet, with one extremity either opposite one of the poles, or a little above the centre of the magnet, the bit of wire will not be attracted by that extremity, and we may hence suppose that the key has acquired no magnetic power by its proximity to the magnet. But if we bring a needle or a piece of iron wire near its remote end, it will be strongly attracted, and shew that end to have the same polarity with the nearest pole of the magnet. Now, the ends both of the key and the wire that are next the magnet, having the same polarity with the pole of the magnet nearest them, cannot attract each other, but on the contrary will repel each other, and therefore the wire cannot adhere to the key, though by the change produced by the other extremity, it is evident that the key has acquired magnetic power.

48 Real exception.

There is, however, one exception. If the key in the first experiment, with the wire hanging to it, be carried from any of the situations there described, towards the middle of the magnet, the wire will fall off as soon as it arrives very near the middle. If we suppose a plane to pass through the centre of the magnet in a direction perpendicular to its axis, so as to form the magnetic equator, a slender piece of iron held any where within this plane can acquire no sensible magnetism, which is demonstrated by its shewing no signs of polarity, and not being attracted by the magnet. Now it is well known that the greatest activity of a magnet resides in its two poles, and that those magnets are the best in which this activity is least diffused. A certain circumference of every magnet is entirely inactive, as we see in the experiment with the iron filings described in N° 26. where the filings collect themselves principally on two points of the surface, between which there is a space all round, to which no filings are attached. Many circumstances shew that the two poles of a magnet have contrary actions; the north pole producing a strong northern polarity in the remote end of an iron bar brought near it, and a south polarity in the proximate end, while an opposite effect is produced by its south pole. Now, adopting this principle, that the actions of the two poles are opposite, it follows that if these actions are equal, and act in a similar manner, each must counteract and prevent the action of the other, and produce what may be called a *magnetic equilibrium*. Therefore if a slender iron rod or thin plate be placed so that every part of it lies within the magnetic equator, it will exhibit no magnetism, will not be attracted by the magnet, and will not attract iron. This will be seen more satisfactorily when we have explained the theory of magnetism.

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The consideration of the above important facts will enable us to explain, especially after what will be stated in the next chapter, the production or communication of magnetism in all the methods by which these are usually effected.

49 Artificial magnetism produced; by *touching* with a magnet.

Magnetism may be produced artificially in a piece of iron or steel, by various methods.

1. *By touching the iron or steel either with a natural magnet, or with a steel bar already magnetized.*

The process of communicating magnetism by natural or artificial magnets, or by what has been called *touching*, has undergone various improvements and modifications, which we shall endeavour briefly to trace.

51 Old methods.

The most simple method of magnetizing a bar of steel is to apply the north pole of a magnet to that extremity of the bar which we wish to acquire a south polarity. In this way, merely by contact, a slight degree of magnetic power will, after some time, be imparted to the bar, and the communication will be expedited by striking the bar so as to make it sound. Only a slight degree of magnetism can, however, be communicated in this way, and unless the steel bar be very short, its poles will be much confused.

Another method of communicating magnetism to a bar of this kind is, to apply the pole of a magnet to one end of the bar, and pass it on to the other end, giving a moderate degree of pressure. This is repeated several times on both sides of the bar, taking care always to begin the stroke at the same end as at first, and instead of drawing the magnet back along the bar, lifting it up every time that we come to the other end. The following description will best explain the mode of communicating magnetism in this way, by one or two magnetic bars.

When only one magnetic bar is to be made use of, one of its poles must be applied as represented fig. 15. where CD represents the needle or steel bar to be impregnated. The magnet AB is then to be drawn all along the surface of it, till it reaches the extremity D. The magnet being then removed, must be applied to the extremity C, and drawn over the needle as before. Thus the needle must be rubbed several times, by which means it will acquire a considerable degree of magnetism. In this method, the other extremity of the needle which the magnet touched last acquires the contrary magnetism; that is, if B be the north pole of the magnet, C will be the north pole and D the south of the needle. This method, however, is never found to be equally effectual with that in which two magnets, or both poles of one magnet, are made use of.

Fig. 15.

To communicate magnetism by means of two magnetic bars, place the bar or needle AB, fig. 16. upon a table; then set the two magnetic bars CD, EF, straight upright upon it at a little distance, equal on both sides from the middle of the bar AB, and in such a manner that the south pole D of one of the bars may be nearest to that end of the bar AB which is to become the north pole, &c. These two bars must then be slid gradually towards one extremity of the bar, keeping them constantly at the same distance from each other; and when one of them, for instance CD, is arrived

Fig. 16.

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rived at A, then they must be slid the contrary way, till EF arrives at B; and thus the bar AB must be rubbed a greater or smaller number of times, till it will be found by trial to have acquired a considerable power. When the magnetic bars are powerful, and the bar AB of very good steel, and not very large, a dozen of strokes are fully sufficient; but when the bars are to be removed from the bar AB, care must be taken to bring them to the same situation where they were first placed; viz. a little and equal distance from the middle of the bar AB, from which they may be lifted up.

The mode of employing two bars instead of one was an improvement, and the method was still farther improved by placing them in an inclined position, with their extremities C, E, remote from each other, and sliding them contraryways from the middle towards each extremity of the bar AB, lifting them up when they come to the extremities, and replacing them on the middle of the bar, thus repeating the operation as often as required.

52 Method of touching curved bars.

Horse-shoe bars, or those of a semicircular form, may be magnetized in a similar manner, except that the magnetic bars employed for the purpose must follow the curvature of the bar to be impregnated. The following is the method usually employed for magnetizing bars of this kind. The crooked bar is laid flat upon a table, and to each of its extremities is applied a straight

Fig. 17.

magnetic bar, as DF, EG, fig. 17. and the remote extremities of these bars F, G, are joined by the conductor or piece of soft iron FG. Then to its middle are to be applied two magnetic bars, with their opposite poles at at little distance from each other, H, I, and with these the crooked bar is to be stroked from end to end, following the direction of the crooked bar, so that on one side of it the magnetic bars may stand in the direction represented by the dotted lines at K and L. When in this manner the piece of steel ABC has been rubbed a sufficient number of times on the one side, it is to be turned, and the same operation repeated on the other side, taking care that the adhering magnetic bars, and the conductor of soft iron, be preserved in the same situation as at first. It must be observed that in this process the magnets DF, DG, as well as the magnets H, I, must be placed so that their south poles shall be towards that extremity of the bar which is to be made a north pole.

53 Duhamel's improvement.

A material improvement in the process for communicating magnetism from artificial magnets to steel bars, was introduced by Duhamel. He formed a right-angled parallelogram, two of the sides of which were made by two equal bars of steel, that were intended to be magnetized, while the other two were formed by joining the extremities of the steel bars by two pieces of soft iron, also equal to each other in length, but much shorter than the steel bars. Then taking two parcels of bars already magnetized, he brought together their opposite poles towards the middle of one of the steel bars forming the parallelogram, and inclining the parcels as

Fig. 18.

in fig. 18. he made them glide gently, separating them from each other towards the extremities of the bar; and this operation was repeated as often as required, when the inclined parcels of magnetic bars were carried to the opposite bars of the parallelogram, and this was rubbed in a similar manner. After the bars were rubbed sufficiently on one side, they were, as in former cases, turned on the other.

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This method is one of the best that we can employ for magnetizing the needles of compasses, and such steel bars as are of a moderate thinness, especially if we employ magnetic bars strongly impregnated for the purpose of rubbing the steel bars.

54 Improvement by Mitchell and Canton.

Much about the time that M. Duhamel contrived the above method, the same object was employing the attention of experimental philosophers in England, where the process of magnetizing bars was much improved by Mr Mitchell and Mr Canton.

Mr Mitchell employed two parcels of bars already strongly magnetized, joined together in a parallel direction, with their opposite poles united at each extremity, but in such a manner, that there remained between the two parcels a small interval. He then placed a number of equal steel bars in a straight line, and made one extremity of the magnetized bars slide over the line formed by the steel bars at right angles; and this he repeated as usual. In this way he found that the intermediate bars in the straight line acquired a great degree of magnetic power.

Mr Canton placed the bar which he wished to magnetize, so as form part of a parallelogram, as in the method of M. Duhamel, and then employed the same means as Mr Mitchell for impregnating the bar; after which he separated the two parcels of magnets, and inclining them to each other in the manner of Duhamel upon the bar, he made them slide from the needle towards the extremities. This last method considerably augmented, according to Mr Canton, the magnetic power of the bar; but by Coulomb it is considered as the only effectual part of the process. These methods of Mitchell and Canton constitute what has been called the double touch, which was still farther improved by the celebrated Æpinus.

55 Method of Æpinus.

This philosopher, after having formed a parallelogram with steel bars, and pieces of soft iron, in the manner of Duhamel, placed upon the bar to be magnetized, two parcels of magnetic bars inclined in such a way that each of them formed on its own side an angle of 15° or 20° with the steel bar on which it was placed; their opposite poles being at a very small distance from one another. Keeping the parcels of magnetic bars in the same relative situation with respect to each other, he made both parcels slide along alternately from the middle of the bar towards each extremity, beginning at every renewal of the operation from the middle of the bar. This method has a very great advantage over the former, as by it we may magnetize bars of considerable length and thickness, by means of magnetic bars that have no great magnetic power.

56 Remarks.

In all these processes it must be remarked, that, in order to proceed properly, it is necessary to employ a considerable degree of pressure. A parallelogram of steel bars and soft iron should be kept firm by wedges, somewhat in the manner of printers types, and the extremities of the magnetic bars should be perfectly cleaned. Dr Robison supposed, that wetting these extremities considerably aided the process; but he found that the least particle of oil between the bars greatly obstructed it, as did the smallest piece of the thinnest gold leaf. He found that bars which were rough acquired a more

powerful

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powerful magnetism than those which were moderately polished; but that, if moderately rough, they acquired the first degrees of magnetism more expeditiously than smooth bars, but did not receive so strong an impregnation as the latter.

57 Improvements of Coulomb.

The method of making artificial magnets has been greatly improved by M. Coulomb, who in a series of memoirs, printed in the Memoirs of the Academy of Sciences, and of the National Institute of Paris, has communicated a number of valuable observations and experiments, that have contributed, perhaps more than any preceding labours, to the advancement both of the theory and practice of magnetism. Many years ago he published his process for making very powerful artificial magnets.

In his operations he uses four very strong magnets previously impregnated. He placed his two strongest magnets, (as NS, NS, fig. 19.) on a horizontal plane in one right line, at such a distance that they might be a few lines nearer to each other than the length of the needle *n s* intended to be magnetized. He afterwards took the two magnets N′ S′, and inclining them as in the method of Æpinus, he placed them first on the middle of the needle, or with their poles nearly in contact. He then drew each magnet, without changing its inclination, to the extremity of the needle, and repeated this operation 5 or 6 times on each face of the needle. It is clear, that in this operation the poles of the needle *n s* remain fixed and invariable at the extremities of the needle, by means of the two strong magnets NS on which it rests. The effect produced by these can only be augmented by the action of the two superior magnets, which concur in magnetizing all the particles of the needle in the same direction.

Fig. 19.

He found likewise, that in this method of magnetizing there is a greater certainty of giving to both surfaces of needles intended to determine the magnetic meridian, an equal degree of magnetism; a circumstance deserving of the greatest attention in the construction of compasses, if the needle be suspended with its broadest surface parallel to the horizon.

After these previous processes, he took 30 bars of steel hardened and tempered to the temper of a spring, five or six lines broad, two or three lines thick, and 36 inches long. The blades of fencing foils, such as are found in the shops, make pretty good magnets. English sheet steel cut into pieces one inch wide, hardened and lowered to spring temper, is preferable. When each compound magnet is to contain no more than 15 or 20 pounds of steel, it is sufficient to make the bars 30 or 36 inches long.

He magnetized each bar singly, according to the method already described. He then took two rectangular parallelopipedons of very soft iron, well polished, six inches in length, between 20 and 24 lines broad, and 10 or 12 lines thick. With these two parallelopipedons, represented fig. 20. at N and S, he formed the armour of his magnet, by enveloping one extremity of each parallelopipedon with a stratum of his magnetic bars, so that the extremities of the parallelopipedons may project beyond the extremities of the bars 20 or 24 lines, and the other end may be enveloped by the ends of the set of bars. On this first layer of steel bars of three or four lines thick he places a second, three inches shorter than the first, so that the first projects beyond the second about 18 lines on each side. The whole is secured at the ends by two binding pieces of copper, which press the bars close together, and prevent the armour from escaping.

Fig. 20.

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Fig. 20. represents two artificial magnets composed according to the method just described. N and S are the extremities of the two iron parallelopipedons. The two other extremities are inclosed by the bars. Each magnet thus compounded is solidly connected together by the copper pieces marked *a*, *b*, *a′*, *b′*. The pieces of contact A, R, join the opposite poles of the magnets.

He found by experience, that with an apparatus of this form, each part weighing 15 or 20lbs. a force of 80 or 100lb. will be required to separate the pieces of contact; and that when an ordinary needle of the compass is placed on the two extremities of the compound bars, fig. 20. they become magnetized to saturation, without its being necessary to rub them with the upper pair. When magnets of greater force are desired, it is necessary, in proportion as the number of bars is increased, to augment their length also, and the dimensions of the parallelopipedons of iron which serve for the armour. It would be easy to ascertain the different dimensions which the magnets ought to have, in a manner sufficiently acurate for practice, from the laws of magnetism, and the position of the centre of action of the bars of steel of different lengths and thickness.

58 Iron or steel becomes magnetic by position.

2. *Iron or steel is rendered magnetical by being placed in a position corresponding to the magnetic meridian.*

It has been often observed, that a bar of iron which has stood for a long time exactly or nearly in the magnetic direction, has acquired a degree of magnetic power, the extremities possessing opposite polarity. In this and other northern parts of Europe, old vanes of turrets, window bars, and even pokers that have stood long inclined in the chimney corner, are often very sensibly magnetic, their lower extremity becoming a north, and the upper a south pole. In the highest part of the steeple of St Giles's church in Edinburgh, on the north side, the upper bar of a hand-rail leading to a stair is very magnetical. It is worthy of remark, that those parts of such old bars which have become foliated and crumbly by exposure to the air are the most magnetical. This magnetic state of perpendicular iron bars was, as we are informed by Dr Gilbert, first observed in the vane spindle of the Augustine church at Mantua.

59 By hammering or friction.

3. *A bar of steel long hammered or exposed to violent friction, while lying in the magnetic meridian, becomes magnetic.*

This fact was well known to Dr Gilbert, who in a plate represents a blacksmith hammering a bar of steel in the magnetic position. Many smiths tools, such as long drills, that receive great pressure while in motion, broaches that are worked with a long lever, so as to act very fast, become very sensibly magnetical; the lower end, in these latitudes, being always a north pole. When a steel punch is driven hard into a piece of iron, the punch has sometimes been rendered magnetical by a single blow. There is scarcely a cutting or boring tool in a smith's shop that does not possess some degree of magnetic power. Even soft steel and iron will acquire it by being violently twisted or exposed to great friction, and the magnetism thus acquired

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quired is commonly permanent. From this circumstance it is difficult to procure for nice experiments pieces of iron that do not possess some degree of magnetism, and hence these experiments do not always succeed. It is therefore convenient to know how to deprive iron and steel of magnetism, and the method of doing this will appear from what will be said in the next section.

The steel balances of watches are often magnetic, sometimes even shewing evident polarity; a circumstance which is found to have some effect in disturbing the proper going of such watches or time-pieces. Hence it is recommended to make the balances of brass. See a paper on this subject by Mr Varley, in the first volume of the Philosophical Magazine.

4. *Magnetism may be induced on substances that are susceptible of it, by heat.*

60 By heat.

Dr Gilbert remarks that such ores of iron as are in that particular metallic state, which he considers as most susceptible of magnetism, will acquire this power by being kept long in a red heat, while in a magnetic direction; and that their polarity corresponds to their position, that end of the mass which is opposite the north becoming a north pole. By many experiments made both by Dr Gilbert, and since his time by Dr Hooke, on iron and steel bars, it appears that these acquire permanent magnetism by being exposed to a strong heat, and suffered to cool gradually while lying in the magnetic direction; but that the magnetism thus acquired by steel rods is much stronger and more durable, if they are suddenly quenched with cold water, so as to give them a very hard temper. Dr Hooke found that the end of the bar next the north, or the lower end of a vertical bar, always became its permanent north pole, and the upper end, even when quenched, while the rest was suffered to cool gradually, became a very sensible south pole. If these operations were performed on bars placed in a position at right angles to the magnetic direction, no magnetism was acquired. Dr Gilbert makes a remarkable observation respecting the position of a magnetic needle brought near an ignited bar of iron, which was some years ago repeated in the Philosophical Transactions as a new discovery. "*Bacillum ferreum, validè ignitum appone versorio excito: stat versorium, nec ad tale ferrum convertitur: sed statim ut primum de candore aliquantulum remiserit, confluit illico.*" Thus it appears that iron is not susceptible of magnetism when red hot, but that it acquires magnetic power during its cooling. Dr Gilbert ascertained the degree of heat most favourable to the production of magnetism, but from his want of proper thermometers he did not succeed. Dr Robison found that though a bright red or a white heat does not make iron susceptible of magnetism while it is exposed to such a heat, it predisposes it for becoming magnetical. He found, that when a bar of steel was made to acquire magnetism by being tempered in the magnetic direction, the acquired magnetism was much stronger when the bar was first made very hot, even though allowed to acquire its most magnetical state before being quenched, than if it had been heated only to this latter degree. Nay, he always found it stronger if quenched while red hot.

He also found that when he heated a small steel bar red hot, and quenched it while lying between two magnets, it acquired a much stronger magnetic power than it would acquire in any other way.

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Mr Canton contrived the following method of producing magnetism in steel bars, without the assistance either of natural or artificial magnets.

61 Canton's method of making artificial magnets.

Take twelve bars, six of soft, and six of hard steel, the former three inches long, one-fourth of an inch broad, and one-twentieth of an inch thick; with two pieces of iron, each half the length of one of the bars; but of the same breadth and thickness. The six hard bars should be each five inches and a half long, one-half inch broad, and three twentieths of an inch thick, with two pieces of iron of half the length, but of the same breadth and thickness as one of the hard bars; and let all the bars be marked with a line quite round them at one end; then take an iron poker and tongs, or two bars of iron, the larger they are, and the longer they have been used, the better; and fixing the poker upright, or rather in the magnetical line between the knees, hold to it, near the top, one of the soft bars, having its marked end downwards, by a piece of sewing silk, which must be pulled tight by the left hand, that the bar may not slide; then grasping the tongs with the right hand, a little below the middle, and holding them nearly in a vertical position, let the bar be stroked by the lower end from the bottom to the top about ten times on each side, which will give it a magnetic power sufficient to lift a small key at the marked end; which end, if the bar were suspended on a point, would turn towards the north, and is therefore called the north pole, and the unmarked end, for the same reason, is called the south pole. Four of the soft bars being impregnated after this manner, lay the other two parallel to each other, at a quarter of an inch distant, between the two pieces of iron belonging to them, a north and a south pole against each piece of iron; then take two of the bars already made magnetical, and place them together so as to make a double bar in thickness, the north pole of the one even with the south pole of the other, and the remaining two being put to these, one on each side, so as to have two north and two south poles together, separate the north from the south poles at one end by the interposition of some hard substance (1, fig. 21.), and place them perpendicularly with that end downward on the middle of one of the parallel bars AC, the two north poles towards its south end, and the two south poles towards its north end. Slide them three or four times backward and forward the whole length of the bar; then removing them from the middle of this bar, place them on the middle of the other bar BD as before directed, and go over that in the same manner; then turn both bars the other side upwards, and repeat the former operation: this being done, take the two bars from between the pieces of iron, and placing the two outermost of the touching bars in their stead, let the other two be the outermost of the four to touch these with; and this process being repeated till each pair of bars have been touched three or four times over, will give them a considerable magnetic power. Fig. 21.

When the small bars have been thus rendered magnetic, in order to communicate the magnetism to the large bars, lay two of them on the table, between their iron conductors as before; then form a compound magnet with the six small bars, placing three of them with

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the north poles downwards, and the three others with the south poles downwards. Place the two parcels at an angle, as was done with four of them, the north extremity of the one parcel being put contiguous to the south extremity of the other, and with this compound magnet stroke four of the large bars, one after another, about twenty times on each side, by which means they will acquire some magnetic power.

When the four large bars have been so far rendered magnetic, the small bars are laid aside, and the large ones are strengthened by themselves, in the manner followed with the small bars.

To expedite the operation, the bars ought to be fixed in a groove, or between brass pins, otherwise the attraction and friction between the bars will be continually deranging them when placed between the conductors.

This whole process may be gone through in about half an hour, and each of the large bars, if well hardened, will lift about 28 ounces troy, and they are fitted for all the purposes of magnetism in navigation and experimental philosophy. The half dozen being put into a case in such a manner, as that no two poles of the same name may be together, and their irons with them as one bar, they will retain the virtue they have received; but if their power should, by making experiments, be ever so much impaired, it may be restored without any foreign assistance in a few minutes.

These bars must be kept in a wooden box, arranged in such a manner that their opposite poles may lie together, as represented at fig. 22.

Fig. 22.

62 Marcel's method.

There are various methods of communicating a permanent magnetism to ferruginous bodies, by means of a bar rendered magnetic, by position, of which the most simple is that described by Mr Marcel, whose experiments were made in the year 1726. Being employed in making some observations on the magnetic power which he found in great pieces of iron, he took a large vice weighing 90 pounds, in which he fixed a large anvil weighing 12lbs. The steel to which he wished to give the magnetic power was laid upon the anvil in a north and south position, which happened to be the diagonal of the square surface of the latter. He then took a four-cornered piece of iron an inch thick every way, 33 inches long, weighing about 8lbs. having one end rounded and brightly polished, the other being tapered. Holding then the steel fast upon the anvil with the one hand, he took the iron bar in the other, and holding it perpendicularly, he rubbed the steel hard with the rounded part towards him from north to south, always carrying the bar far enough round about to begin at the north. Having thus given 10 or 12 strokes, the steel was turned upside down, and rubbed as much on the other side. Proceeding in this manner till it had been rubbed 400 times, the steel was as strongly magnetic as if it had been touched by a powerful loadstone. The place where he began to rub was always the north pole. In these experiments it sometimes happened that the virtue was imparted by a few strokes; nay, by a single stroke a small needle was made to receive a very considerable power. Thus he imparted to two compass needles such a degree of magnetic power, that one lifted three-fourths, and another a whole ounce of iron, and although these needles were anointed with lintseed oil to keep them from rusting, and a hard coat was thus formed upon them, they nevertheless retained their power. Thus also a knife was made so strongly magnetical, that it would take up an ounce and three-fourths of iron. Four small pieces of steel, each an inch long, and one-twelfth of an inch broad, as thin as the spring of a watch, were thus impregnated with the magnetic power, and then joined into a small artificial magnet; which at its first formation took up eight times its own weight of iron; and after being six years kept in the most careless manner, was found to have gained rather than lost any thing of its power. In the course of his experiments, Mr Marcel found, that the end at which he began to rub was always the north pole, whatever position the steel was laid in. On rubbing a piece of steel from one end to the middle, and then from the other end to the middle, it acquired two north poles, one at each end, the middle being a south pole. Beginning to rub from the middle towards each end, he found a north pole in the middle, and a south pole at each extremity.

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63 Method of magnetizing a piece of soft steel.

Magnetism may be communicated to a small piece of soft steel in the following manner: take two iron bars of about an inch square, and upwards of three feet in length; keep them in the magnetical line, or in a perpendicular posure, as represented fig. 23. Let the piece of steel CB be either fastened to the edge of a table, or held by an assistant; and placing the lower extremity of the bar AB, and the upper extremity of the bar CD, on opposite sides, and in the middle of the steel, stroke the latter from the middle towards its extremities, moving both bars at the same time. When both are arrived at the extremities of the steel, remove them from it, and apply them again to the middle. Do so for 40 or 50 times, and the steel will be found to have a considerable degree of magnetic power. Care, however, must be taken, in removing the bars, not to draw them along the surface of the steel, or the experiment will not succeed, because the magnetism is destroyed by the contrary strokes.

Fig. 23.

64 Dr Knight's artificial loadstone.

The late Dr Gowin Knight possessed a surprising skill in magnetism, being able to communicate an extraordinary degree of attractive or repulsive power, and to alter or reverse the poles at pleasure; but as he refused to discover his methods upon any terms whatever (even as he said, though he should receive in return as many guineas as he could carry), these curious and valuable secrets have died with him. In the 69th volume of the Philosophical Transactions, however, Mr Benjamin Wilson has given a process, which at least discovers one of the leading principles of Dr Knight's art, and may perhaps be a means of discovering the whole to those who shall be less reserved. The doctor's process, according to Mr Wilson, was as follows. Having provided himself with a great quantity of clean iron filings, he put them into a large tub, that was more than one-third filled with clean water; he then, with great labour, worked the tub to and fro for many hours together, that the friction between the grains of iron by this treatment might break off such smaller parts as would remain suspended in the water for a time. The obtaining of these very small particles in sufficient quantity seemed to him to be one of the principal desiderata in the experiment. The water being by this treatment rendered very muddy, he poured the same into a clean iron vessel, leaving the filings behind;

Experimental Illustrations.

hind; and when the water had stood long enough to be clear, he poured it out carefully, without disturbing such of the sediment as still remained; which now appeared reduced almost to an impalpable powder. This powder was afterwards removed into another vessel in order to dry it; but as he had not obtained a proper quantity thereof by this one step, he was obliged to repeat the process many times. Having at last procured enough of this very fine powder, the next thing was to make a paste of it, and that with some vehicle which would contain a considerable quantity of the inflammable matter; for this purpose he had recourse to lintseed oil in preference to all other fluids. With these two ingredients only he made a stiff paste, and took particular care to knead it well before he moulded it into convenient shapes. Sometimes, while the paste continued in its soft state, he would put the impression of a seal upon the several pieces; one of which is in the British Museum. This paste was then put upon wood, and sometimes on tiles, in order to bake or dry it before a moderate fire, at about the distance of a foot. He found that a moderate fire was most proper, because a greater degree of heat made the composition frequently crack in many places. The time required for the baking or drying of this paste was generally about five or six hours before it attained a sufficient degree of hardness. When that was done, and the several baked pieces were become cold, he gave them their magnetic power in any direction he pleased, by placing them between the extreme ends of his large magazine of artificial magnets for a few seconds or more as he saw occasion. By this method the power they acquired was such, that when any of these pieces were held between two of his best ten guinea bars, with its poles purposely inverted, it immediately of itself turned about to recover its natural direction, which the force of those very powerful bars was not sufficient to counteract.

In the 66th volume of the Philosophical Transactions we have the following account from Dr Fothergill, of Dr Knight's method of imitating natural magnets, but which is by Mr Cavallo supposed to be some mistake or misinformation. "I do not know," says he, "that ever the doctor (Dr Knight) left behind him any description of a composition he had made to form artificial loadstones. I have seen in his possession, and many other of his friends have likewise seen, such a composition, which retained the magnetic virtue in a manner much more fixed than either any real loadstone, or any magnetic bar, however well-tempered. In the natural ones he could change the poles in an instant, so likewise in the hardest bars, but in the composition the poles were immoveable. He had several small pieces of this composition which had strong magnetic powers. The largest was about half an inch in breadth, very little longer than broad, and near one-fourth of an inch thick. It was not armed, but the ends were powerfully magnetic; nor could the poles be altered, though it was placed between two of his largest bars, and they were very strongly impregnated. The mass was not very heavy, and had much the appearance of a piece of black lead, though not quite so shining. I believe he never divulged the composition, but I think he once told me, the basis of it was filings of iron reduced by long-continued attrition to a perfectly impalpable state, and then incorporated with some pliant matter to give it due consistence.

Experimental Illustrations.

From these accounts it appears that the basis of Dr Knight's artificial loadstones was the black powder to which iron filings are reduced by being shaken with water, or the *black oxide of iron*, formerly called martial æthiops. Hence Mr Cavallo supposes that the following receipt for imitating the natural magnets will answer the purpose.

Take some martial æthiops, reduced into a very fine powder, or, which is more easily procured, *black oxide of iron*, the scales which fall from red-hot iron when hammered, and are found abundantly in smiths shops. Mix this powder with drying lintseed oil, so as to form it into a very stiff paste, and shape it in a mould so as to give it any form you require, whether of a terrella, a human head, or any other. This done, put it into a warm place for some weeks, and it will dry so as to become very hard; then render it magnetic by the application of powerful magnets, and it will acquire a considerable power.

Sect. IV. *Of the Circumstances which tend to impair or destroy the Magnetic Power.*

65 Magnetism lost or destroyed,

The magnetic power in all its modifications, whether of attraction, repulsion, or polarity, is in general temporary and perishing. The best magnets, whether natural or artificial, unless carefully preserved, with attention to certain circumstances that will presently appear, are observed to have their magnetic power diminished. Natural magnets, and artificial magnets made of steel tempered as hard as possible, retain their power most obstinately, and seldom entirely lose it except under circumstances which we know to be unfavourable to its durability. Magnets of steel of a spring temper, are much sooner weakened, lose more of their force merely by keeping, and finally retain little or none of it. Soft steel and iron seldom retain magnetic power when removed from the magnet where they acquired it, unless their metallic state undergoes some change.

The following circumstances have been observed to be most powerful in diminishing or destroying the power of magnets.

66 by improper position;

1. *Improper position.* Nothing has so much effect in impairing the power of a magnet as keeping it in an improper position, that is, too far from the magnetic line. If the axis of the magnet be placed in a direction that is at right angles with the magnetic meridian, that is, in this latitude nearly E. N. E. and W. N. W. it will soonest lose its magnetic power; and if it be placed in the magnetic line, but in a contrary position, or with the north pole where the south pole should be, if permitted to vibrate freely, it will gradually become weaker every day, and unless it be a natural magnet, or an artificial one made of very hard tempered steel, it will, in no very long time, entirely lose its magnetic power.

67 by heat;

2. *Heat.* The dissipation of magnetic power is greatly promoted by heating the magnet. The heat of boiling water has a sensible effect in this way; but if the magnet be exposed to a red heat, its power is entirely destroyed, as has been long known. Dr Gilbert observed that the power of magnets was destroyed by a

Theory. heat that was not sufficient to make the metal visible in the dark; and Mr Canton found that the heat of boiling water weakened the power of a magnet, but that the greatest part of this was recovered as the magnet cooled. If the heat be applied when the magnet lies in a position most favourable to the dissipation of magnetism, the power is soonest destroyed; hence, the best way to deprive iron or steel of accidental magnetism is, to heat it red hot, and allow it to cool while lying in a direction perpendicular to the magnetic line.

M. Coulomb has ascertained that at 200 degrees of heat, two-fifths of the magnetism of a magnet is dissipated, and that at 500 degrees the whole is lost.

68 by violent treatment; 3. *By violent treatment.* It is very extraordinary that the power of a magnet is impaired by rough usage. Dr Gilbert observed that a magnet which he had powerfully impregnated was greatly weakened by a single fall on the floor; and since his time it has been observed that when a magnet falls on a stone, or receives any concussion that makes it ring, it is injured much more than by being beaten with any thing soft and yielding. When a natural magnet is ground with coarse powders, in order to bring it to any required form, it is considerably weakened. This shows the propriety of altering the natural form of loadstones as little as possible, and when this is necessary, of doing it as expeditiously as may be, by cutting them briskly in the thin disks of a lapidary's wheel.

69 by similar poles being opposite. 4. *Placing them near each other with their similar poles opposite.* Magnets situated in this way always weaken each other, and when a powerful magnet is placed near a weaker, with their similar poles opposed, the polarity of the weaker is frequently reversed, that is, if the pole were north it becomes south, and *vice versa*. When the weaker magnet is a natural loadstone, or has been made of hard tempered steel, its original polarity is restored when the improper position is changed; but if it has been made of spring-tempered steel, the alteration is generally permanent, and often as complete as while the magnets were in the neighbourhood of each other.

Chap. III. *Theory of Magnetism.*

70 Opinions of the ancients. Respecting the notions which the ancient philosophers entertained about the cause of magnetic phenomena, we know very little. One curious opinion which they entertained of the reason why a magnet was improved by the contact of iron, is worth noticing. They conceived that the magnet *fed upon the iron*, and hence acquired additional attractive power: and when deprived of this pabulum, it grew weak and languid.

> ——"Nam ferro nurunt vitam, ferrique vigore
> Vescitur; hoc dulces epulas, hoc pabula novit;
> Hinc proprias renovat vires, hinc fusa per artus
> Aspera secretum servant alimenta vigorem.
> Hoc absente perit, tristi morientia torpent
> Membra fame, venasque sitis consumit apertas."
>
> Claudian.

In the 16th century, the philosophers of modern times first began to speculate about the cause of magnetic polarity, a phenomenon which then became interesting on account of the difference of declination observed by navigators. Various trifling opinions were published on the subject. Some said that the needle was directed by a certain point in the heavens, which was little more than saying that it pointed one way. Others ascribed the direction of the needle to vast magnetic rocks situated in the earth; but as to the exact situation of these rocks, they did not give themselves the trouble to inquire, till Fracasteri observed, that, if these rocks are supposed to be situated in any part of the globe yet visited by navigators, and if, as we must suppose, they act like loadstones, they will cause the direction to be very different from what is observed. He therefore placed them somewhere in the inaccessible polar regions, though not immediately at the poles. Norman, who, as we have seen (*Dipping needle*), discovered the dip of the magnetic needle, and observed that in every part of Europe, the north pole pointed very far below the horizon, was naturally led to ascribe this effect to the influence of the earth, though he does not express himself as if he thought that the needle was attracted by any point within the earth, but only that it was always directed to such a point. Theory.

71 Gilbert's theory. From comparing the different positions of the compass needle, as described by Norman, with the positions which he had himself observed small needles to assume in relation to a magnet, Dr Gilbert was naturally led to consider the earth as a great loadstone, or else containing a great loadstone within it, which arranged the dipping needle, or the needle of the compass, in the same manner as he observed a small needle poised on its pivot, to be arranged by a large magnet. Dr Gilbert has explained his theory at large in his *Physiologia Nova de Magnete, et de Tellure Magno Magnete*. It may be briefly expressed in the following terms. All the appearances of natural magnetism are similar to what would be observed in the earth, were a large magnet with its poles situated near the poles of the equator, viz. the north pole not far from Baffin's bay in North America, and the south pole in about the opposite part of the globe. If a dipping needle were exposed to the influence of such a large magnet, it must arrange itself in a plane passing through the magnetic poles, a position indicated very nearly by the mariners needle; and the more we recede from the equator of the great magnet, the more must the dipping needle be inclined to the horizon.

72 Dr Gilbert's theory was equally ingenious and important, and affords, if firmly established, a complete explanation of all the phenomena of magnetism. At the time it was first published, however, observations were neither sufficiently numerous, nor sufficiently accurate, to enable the author to assign the real position of the great magnet, nor to ascertain its laws of action. The theory was chiefly founded on observations made by the dipping needle, and though those instruments made by Norman were more accurate than might have been expected at so early a period of the science, the observations made with them cannot, from many circumstances, be implicitly relied on. We are still in want of a numerous collection of observations on the dip, in order to perfect our knowledge of the magnetic poles. We can only say that the earth acts on the compass needle in the same manner as a large magnet would act; but the appearances do not seem to resemble the effects of what we should consider as a good loadstone having two vi-

gorous

Theory. gorous poles, but rather such as would result from the action of a very irregular loadstone with its poles very much diffused.

73 It is unfortunate that our most numerous observations of the dip have not been made in those places where they would be the most instructive. Dr Robison was of opinion that a series of observations should be obtained, extending from New Zealand northward, across the Pacific ocean to Cape Fairweather on the western coast of North America, whence it should be continued through that part of the continent. A second series might extend from the Cape of Good Hope along the western coast of Africa to the tropic of Capricorn; thence across the interior of the African continent through Sicily, Italy, Dalmatia, the eastern part of Germany, the gulf of Bothnia, Lapland, and the western part of Greenland. This series would be nearly in a plane passing through the probable situations of the poles. A third series might extend at right angles to the last, so as to form a small circle crossing the former, passing near Japan, through the island of Borneo, and the western part of New Holland; near Mexico, and a few degrees west of Easter island. Here and at Borneo there would be a considerable inclination of the magnetic plane to the horizon, though this cannot be found out. There are, however, other points of this circle in which the dip is considerable, where the inclination may be discovered. In short, all circumstances seem to indicate a multiplicity of poles, or, what renders calculation most difficult, an irregular magnetism in which the polarity is very much diffused.

Philosophers are very much divided respecting the situation of the magnetic poles of the earth. We shall here state only a few of their opinions, reserving a fuller account of some of them for the article *Variation of the Compass*.

74 Opinions as to the situation of the magnetic poles. Dr Halley thought that the north magnetic pole was near Baffin's bay in North America.

Professor Krafft (see Petersburgh Comment. vol. xvii.) places the north pole in N. Lat. 70° and W. Long. 23° from London; and the south pole in S. Lat. 50°, and E. Long. 92°.

Wilcke of Stockholm places the north pole in N. Lat. 75° near Baffin's bay, and in the longitude of California, while he fixes the south pole in S. Lat. 70° in the Pacific ocean.

Churchman supposes the north pole to be in N. Lat. 59°, and W. Long. 135°, a little inland from Cape Fairweather; and the south in S. Lat. 59°, and E. Long. 165°, directly south of New Zealand. (See Variation).

Euler (Memoirs of the Acad. of Berlin, vol. xvi.) places the north pole in N. Lat. 75°. Lemounier (*Lois du Magnetisme*) in N. Lat. 73°. Buffon in N. Lat. 71°.

La Lande places it in N. Lat. 77° 4′, and in about W. Long. 98° from Paris. (See *Connoissance des Tems*, an. xii.).

However ingenious this hypothesis of Dr Gilbert was, it appears to have been nothing more than a sagacious conjecture. The hypothesis, however, is confirmed into a rational theory by many observations and experiments which were unknown or unthought of in Dr Gilbert's time.

75 Proofs of the truth of the theory. Mr Hindshaw's beautiful experiment on the effect of an upright iron bar on the opposite ends of a compass-needle, according as one end or the other of the bar is next the earth (see *Variation of the Compass*) is an abundant proof of the justness of this theory. Theory.

We can imitate that experiment in a very satisfactory manner by artificial magnetism; thus forming a just comparison between the action of the earth and that of a magnet.

Let a large bar magnet, as SAN (fig. 24.) be supported so as to have its ends detached from surrounding bodies. Then place a small needle nicely poised, as B, about three inches below N, the north pole of the magnet, and so that its directive power for the magnet may be very weak. Now take a small piece of soft iron, and hold it in such a position as is represented at C; its lower end becoming a north pole, will attract the south pole of the needle. Now, while the needle is kept in the same position, turn round the piece of iron into the position D; the south pole of the needle will be seen to avoid it, and the north pole will be attracted. Here the magnet may be compared to the earth, and the small piece of iron to the iron bar in Mr Hindshaw's experiment. Fig. 24.

Again, it has been seen that magnetism may be produced in iron or steel by hammering or heating them while in a determinate position with respect to the earth. The same effect will be produced by the same processes while the iron or steel is in the neighbourhood of a powerful magnet.

Lastly, the circumstance of the magnetic inclination of the north pole of the dipping needle being diminished, and the horizontality of the compass needle destroyed, as we ascend above the earth, is an additional and certain evidence of the truth of this theory.

In short, we may consider it as demonstrated, that the earth is a great magnet, or contains a great magnet, by the influence of which the direction of the needle and all the magnetic power acquired by iron, when placed in a proper position, are produced.

A further illustration and application of this theory will be given presently, when we have considered some other hypotheses posterior to that of Dr Gilbert.

76 Theories of impulsion. It was very early an object with philosophers to assign the immediate cause of magnetic attraction and repulsion, and of that faculty of mutual impregnation which so remarkably distinguishes iron from all other substances. In particular, the curious arrangement of iron filings strewed round a magnet forcibly attracted their attention. It is scarcely possible to observe this arrangement without conceiving the idea of a stream of matter issuing from one of the poles of the magnet, moving round it, entering by the other pole, and again issuing by its former outlet. Accordingly, such an idea was entertained in the earliest times; but very different notions prevailed as to the manner in which such a stream produced the effects observed. One of the simplest methods was, to conceive it acting by impulsion, like any other stream of fluid matter. This idea was entertained by Lucretius, who supposed the surrounding air to be swept out of the way by the impulsion of the fluid, which thus rushing round the magnet carried the iron filings towards it.

77 Euler's hypothesis. In the last century Euler framed an hypothesis of magnetism on this theory of impulsion. He supposes, that the two principal causes which concur in producing the

Theory. the wonderful properties of a magnet, are, First, A particular structure of the internal pores of the magnets, and of magnetical bodies; and, Secondly, An external agent or fluid, which acts upon, and passes through these pores. This fluid he supposes to be the solar atmosphere, or that subtle matter called *ether*, which fills our system.

Indeed, most writers on this subject agreed in supposing that there are corpuscles of a peculiar form and energy, which continually circulate around and through a magnet; and that a vortex of the same kind circulates around and through the earth.

"A magnet, besides the pores which it has in common with other bodies, has also other pores considerably smaller, destined only for the passage of the magnetic fluid. These pores are so disposed as to communicate one with the other, forming tubes or channels, by which the magnetic fluid passes from one end to the other. The pores are so formed, that this fluid can only pass through them in one direction, but cannot return back the same way; similar to the veins and lymphatic vessels of the animal body, which are furnished with valves for this purpose: So that the pores of the magnet may be conceived to be formed into several narrow contiguous tubes, parallel to each other, as at Fig. 25. A, B, fig. 25. through which the finer part of the ether passes freely from A to B, but cannot return back on account of the resistance it meets with at *a*, *a*, *b*, *b*, nor overcome the resistance of the grosser ether, which occasions and continues the motion. For supposing the pole A of a magnet, filled with several mouths or open ends of similar tubes, the magnetic fluid, pressed by the grosser part of the ether, will pass towards B with an inconceivable rapidity, which is proportionable to the elasticity of the ether itself; this matter which, till it arrives at B, is separated from the tubes by the grosser parts, then meets with it again, and has its velocity retarded, and its direction changed; the stream, reflected by the ether, with which it cannot immediately mix, is bent on both sides towards C and D, and describes, but with less velocity, the curves DE and CF *e*, and approaching by the curves *d* and *e*, falls in with the effluent matter *m m*, and again enters the magnet; and thus forms that remarkable atmosphere, which is visible in the arrangement of steel filings on a piece of paper that is placed over a magnet *."

* *Letters à une Princesse d'Allemagne.*

78 We have already had occasion (see the article IMPULSION) to make some observations on the general doctrine of impulsion, and these need not be here repeated. Respecting the explanations afforded by the canals and dock-gates in Euler's hypothesis, opening in one direction and shutting in the other, we may observe, that as these constructions are altered in a moment in a bar of soft iron, merely by changing the position of the magnet, it is astonishing that they should ever have been conceived by so acute a philosopher. Even supposing such circumstances to take place, the effects resulting from them should be the reverse of what are actually observed, as the impelling stream should move those bodies least which afford the readiest channels for its passage. If the iron filings were arranged by this impelling stream, they should be carried along with it, and if they are carried towards one pole of the magnet, they should be driven away from the other.

Theory. Æpinus, of the academy of Petersburgh, whose theory of electricity we have explained and illustrated at considerable length, was led by the analogy observed between the phenomena of electricity and those of magnetism, and in particular from the resemblance between the attractions and repulsions of the tourmalin and those of a magnet, to conceive the idea that both classes of phenomena might be explained in a similar manner, or that the phenomena of magnetism, like those of electricity, were to be attributed to the motions of a certain fluid existing in all bodies susceptible of magnetism. This conjecture was confirmed by observing, that when magnetism was induced on a piece of iron by its proximity to a magnet, the power of the magnet is not sensibly diminished. The following is an abstract of Mr Æpinus's hypothesis.

79 Theory of Æpinus.

1. There exists in all magnetic bodies a substance which may be called the magnetic fluid, the particles of which repel each other with a force that decreases as the distance increases.

2. There is a mutual attraction, varying according to the same law, between the particles of the magnetic fluid, and the particles of iron.

3. There is a mutual repulsion among the particles of iron, following the same law.

4. The magnetic fluid is capable of moving through the pores of iron, and soft steel, without any considerable difficulty: but its motion is more and more obstructed as the steel receives a harder degree of temper; and in steel of the hardest temper, and the ores of iron, it moves with the greatest difficulty.

5. From the supposed attraction between the magnetic fluid and iron, the latter may contain a certain determinate quantity of the former, and this quantity will be such that the accumulating attraction of a particle of it for the whole of the iron, balances the repulsion between the particles of the whole fluid contained in the iron; supposing the quantity of fluid competent to a particle of iron to be such, that the repulsion between it and the fluid competent to another particle of iron, is also equal to its attraction for that particle of iron. Therefore the attraction between the fluid in one iron bar A, and the iron of another bar B, is just equal to the repulsion between the iron in A and the iron in B. This determinate quantity of fluid in the iron is called its *natural quantity*.

6. From the mobility of the fluid through the pores of iron, it may, by the agency of a proper external force, be abstracted from one end of an iron bar, and condensed in the other end. This, however, is a violent state, and the mutual repulsion between the particles of condensed fluid, together with the attraction between the fluid and that part of the iron which it has quitted, tend to produce a more uniform distribution. It is evident that something of this tendency must take place in every state of condensation and rarefaction, and that a perfect equilibrium can be produced only when the fluid is diffused with perfect uniformity. This state of uniformity may be called the natural state of the body.

7. The production of such a uniform distribution will depend on the nature of the resistance to the motion of the fluid, opposed by the iron in its various states. If this resistance arises merely from the communication of motion, like that which perfect fluids oppose to the motion

Theory. tion of solid bodies, such resistance may be overcome by the weakest tendency to uniform diffusion; but if, as seems most likely, the obstruction is like that of a clammy fluid, or of a soft plastic body like clay, after the accumulation arising from the action of an external force, it may remain after that force is removed; and the diffusion will cease when there is a perfect equilibrium between the obstruction and the diffusing force.

As the illustration of this theory in general cases is precisely similar, *mutatis mutandis*, with that of electricity, so fully detailed under the article ELECTRICITY, from N° 299. to 348. we need not repeat it here, but may refer the reader to that treatise, requesting him to consider the illustration as relating to the *magnetic* fluid.

It is proper, however, to remark here, that the phenomena of magnetism are limited by this circumstance; that magnets always contain their natural quantity of fluid. Of course, their action on iron, and on each other, depends entirely on its unequal distribution.

The most important part of this theory is that which explains the induction of magnetism on iron and steel by juxtaposition to a magnet; but before we can properly enter on that, we must notice some other particulars respecting the theoretical part of our subject.

80 Law of magnetic action. A very material point in magnetism, as in electricity, is to ascertain the law of action, according to which this power acts on the particles of iron and other matter; and accordingly this has long been an object of attention with philosophers. The difficulty of ascertaining this law is extremely great, as will readily appear by the following consideration.

In the action of two magnets on each other, as A and B, there are four different actions to be considered that act at the same time, though with different degrees of force, and in different directions. Thus the north pole of A repels the north pole of B, and attracts its south pole, while the south pole of A exerts a repulsion on the south pole of B, and an attraction on its north pole. Now the force, which we attempt to measure, is compounded of these four forces; and these we cannot measure separately. The attraction observed is the excess of two attractions that are unequal above two unequal repulsions, and *v. v.* with respect to the observed repulsion. Further, if we reflect that it is possible for a mutual action to exist between every two particles of the different magnets, and that the intensity of this action may vary, not only at different distances, but at the *same* distance, the difficulty will be greatly increased.

81 Experiments of Muschenbroeck, Numerous experiments have been made with a view of ascertaining this law. Mr Cavallo has detailed many of those made by Muschenbroeck; but their results are so anomalous, that their inaccuracy is apparent. Indeed, the attempt to ascertain this law by observing merely the attractions and repulsions, was very unphilosophical. The method employed by Mr Hawksbee and Dr Brook Taylor, viz. observing how far the action of a magnet made a compass needle deviate from the meridian at different distances, was much more scientific, as this deviation is occasioned by the difference of the two sums of the same forces; and this may be made many times greater than the other, and must of course be much more sensible. The shape of the magnets employed by them was, however, very improper. Some experiments made by Mr Lambert of the academy of Berlin, were very judicious. He placed a magnetic needle at various distances from a magnet, but in the direction of its axis, and marked the declination from the magnetic line produced by the action of the magnet, and the obliquity of the magnet to the axis of the needle. Thus the action of the magnet and the natural polarity of the needle were placed in opposition and equilibrium; but the great difficulty was to discover the proportional change of these forces by their obliquity of action on this small lever.

Theory. 83 of Lambert. Mr Lambert observed, that when the obliquity of the magnet to the axis of the needle was $=30°$, the needle was made to decline $15°$; and when the obliquity was $=75°$, the needle declined $30°$. Let us call the obliquity o and the declination d, and let us put f for that function of the angle which is proportional to the action. Also let us call the natural polarity of the needle p, and the force of the magnet m. Then it is evident that $p \times f : 15 = m \times f : 30$; and $p : m = f, 30 : f, 15$; and for the same reason $p : m = f, 75 : f, 30$, and therefore $f, 15 : f, 30 = f, 30 : f, 75$. But sine $15 : 30 =$ sine $30 : s\ 75$; hence Mr Lambert concluded, that the *sine* was that function of the angle which was proportional to the action of magnetism on a lever. As this point, however, could not be determined by one experiment, he compared several other obliquities and declinations with the same distances, and with different distances of the magnet, and fully proved that he was right in his conjecture.

The result of Mr Lambert's experiments fully proves the fallacy of the theories of impulsion, which pretend to explain magnetic action by the impelling power of a stream of fluid, or by pressure produced by the motion of such a stream; as in such a case the pressure on the needle must have diminished in the duplicate ratio of the sine; or with the angle $90°$ the directive power must have been four times as much as with the angle of $30°$, whereas it is shewn by observation to be only twice as much.

When Mr Lambert had ascertained the effect of obliquity, he proceeded to examine that of distance; and he found, that if we put f for the force of the magnet, and δ for the distance of the nearest pole of the magnet from the centre of the needle, and a for a constant quantity nearly equal to two-thirds of the length of the needle, f will be proportional to $(\delta - a^2)$.

84 Dr Robison's investigations. Dr Robison endeavoured to investigate this law in a very simple manner. He caused to be made some magnets consisting of two balls connected by a slender rod. By a particular mode of impregnation (which we suppose to be quenching them, after being red hot, between two magnets) he gave them a pretty good magnetism; and the force of each pole appeared to be nearly confined to the centre of the ball, which was his object in making them of such a shape, as it reduced the examination of their attractive and directive power to a very easy computation. The result of his experiments was, that the force of each pole varied inversely as the squares of the distances, or at least the error arising from such an hypothesis was very small, amounting only to one-fifteenth of the whole.

Dr Robison made a near approximation to the law of

Theory. of action, by supposing that the function of the distance expressing that law, represented by the ordinates of a curve similar to the hyperbola, referred to its assymptote as an axis, towards which its curve was of course alway convex. On this supposition he explained the atractions and repulsions of magnets nearly in the following manner:

85 Picture of the magnetic forces. Fig. 26. Let there be two magnets, A and B (fig. 26.) placed so that their four poles, S, N, s, n, may be in a straight line. Now, in the straight line O q take O m, O p, O n, O q=N s, N n, S s, S n; and let MPNQ be a curve line, whose asymptotic axis is the said line O q. Draw the ordinates m M, p P, N n, q Q to the curve, and these will represent the intensities of the forces exerted between the poles of the magnets. The distance between m, n, or between p and q= the length of the magnet A, and $m\,p$ or $n\,q$= that of B, and M m, P p, N n, and Q q, are pairs of ordinates that are equally distant. Now, it is easy to see from the figure, that in whatever situation the pairs of equidistant ordinates may be, M m+Q q will always exceed P p+N n, or the sum of the attractions will always be greater than that of the repulsions.

Let the chords MQ, PN, MP, NQ be drawn. Bisect them in B, D, E, F, and join EF. Draw the ordinates E e, F f, and BD b (cutting EF in C). Draw P u parallel to the axis, cutting E c in ε. Draw also Q i parallel to the axis, cutting F f in φ. Also draw FHL parallel to the axis, and P o t parallel to QN; and draw PL l, and P e x, cutting M m in l and x. Let each ordinate be represented by the letter at its intersection with the axis. Thus, the ordinates, M m and Q q may be represented by m and q, &c. Because MP is bisected in E, M t is double of E ε, M l is double EL, and M x double of E c. Again, P t being parallel to Q n, and P u to Q i, $t\,u$ equals N i.

86 If these ordinates are supposed to represent the mutual action of the magnetic poles, their tendency to or from each other, that is, their attractions or repulsions, may be expressed by $(m+q)-(n+p)$ which represent the excess of the sum of the actions of the nearest and most remote poles above the sum of the action of the intermediate distant poles. This tendency may often be conveniently represented by $(n-p)-(n-q)$ or the excess of the difference of the actions exerted by the nearest pole of A on the two poles of B, above the difference of the actions of the remote pole of A on the same poles of B. Now, 1. If we suppose the dissimilar poles of A and B to front each other, $m+q$ will represent attractions, and $p+m$, repulsions; but $m+q$ is greater than $p+n$, therefore A and B will attract each other. Again $(m+q)-(p+n)$ equals M t, = 2 E o = 2 BD =4 CD.

The above action will be increased by any one of four circumstances, as, 1. By increasing the strength of either magnet. 2. By lessening the distance between the two magnets. 3. Increasing the length of A, the distance between it and B remaining the same. 4. By increasing the length of B, the distance between it and A remaining the same.

2dly, Let us place the magnets, so that their similar poles front each other. Here it is evident that the ordinates which in the former case represented attractions, will now represent repulsions, and that the repelling forces of the magnet are equal to the former attracting forces at the same distances. As magnets are seldom perfect, the repelling forces are, however, usually weaker than the attracting. Theory.

87 Explanation of directive power. To explain the directive power of magnets, Dr Robison supposed the magnet A not to be at liberty to approach B or recede from it, but to be supported at its centre B, so as to turn round it. Now, its south pole s being more attracted by N than it is repelled by S, B is on the whole attracted by A, and by this attraction would vibrate like a pendulum supported at the centre B. Again, the north pole n being repelled by N more than it is attracted by S, will be on the whole repelled, and B n would also vibrate round B. Thus B would be kept in the position s B n. This will be more evident if we suppose the magnet B arranged at right angles to the line AB, as in the dotted representation s' B n'; for now s' and n' are urged in opposite conspiring directions with equal force, which, if the magnet be very small, will act nearly at right angles to n' s'. If the position were oblique, the forces would be somewhat unequal; and allowances must be made for the obliquity of the action, that we may know the precise rotative momentum. This modification of the action of A on B, we call the directive power of A; and the modification of B, by which it tends to or from A, we call the polarity of B.

Now, the directive power of A and the polarity of B may be increased, 1. By increasing the strength of either A or B, or both; 2. By diminishing the distance between A and B; 3. By increasing the length of A; and, 4. By diminishing the length of B, the distance between them remaining the same.

We may remark, that the directive power of A is always greater than its attractive power, by a certain measure which we may represent by the formula 2 (p—q) which is thus derived. The difference between them may be expressed by $t\,l$=2 o L; but $\varepsilon\,c$= P p=p, and ε L=P p—F f=P p—Q q—F φ=P p—Q q— $o\,\varepsilon$; therefore o L = P p—Q q, and $t\,l$ = 2 (P p—Q q)=2 (p—q).

This picture of the forces, attentively examined, will suggest to the reader many interesting and instructive particulars. 88 Curious phenomenon. Dr Robison used to relate a curious and instructive phenomenon that he was long puzzled to explain respecting the mutual action of large magnets. Amusing himself with some experiments on magnetism, with two large strong magnets, as AB. fig. 27. which Fig. 27. were placed at about the distance of three inches with their opposite poles fronting each other, he had placed a small needle balanced on a point between them as at D, which arranged itself in the same line with the magnets; but happening to set it off to a considerable distance on the table, as at F, he was surprised to see it instantly turn round on the point, and arrange itself in an opposite direction. When brought back to D, it reassumed its former position, but when he carried it out gradually along the line DF, perpendicular to N s, he found it grow sensibly more feeble, vibrating more slowly; and when arrived at a certain point E, it shewed no polarity towards either A or B, but retained any position given it: but when carried farther out, it again acquired polarity to the magnets, though in a contrary direction, arranging itself parallel to NS, with its north pole next to N, and south pole next to S. Being

interrupted

Theory. interrupted in the prosecution of this experiment, but having marked the line DF on the table, he afterwards replaced the magnets and needle, placing the latter at E, where he expected it to be neutral; but it now turned its north pole towards B, and did not become neutral till carried further out. When standing there, something happened to move the magnets A and B, which instantly rushed together, and at the same instant the needle turned itself briskly, and arranged itself as before at F. In short, by gradually withdrawing the magnets from each other, he found that the needle first became weaker, then neutral, and then turned into the opposite position.

Dr Robison explained this curious phenomenon by what he calls primary and secondary magnetic curves, such as NHM, NEL, and SGK, SEI; but our limits do not permit us to enter here on the investigation of these curves.

89 Law of action probably *inversely as the squares of the distances.* From all Dr Robison's experiments and calculations, he appears to have been fully convinced, that the true law of magnetic action is in the *inverse duplicate ratio of the distances*, and his opinion is still farther strengthened by the ingenious experiments of M. Coulomb related in the *Memoirs of the Academy of Sciences at Paris* for 1786 and 1787, or the *Jour. de Phy.* vol. xliii.

We are now prepared to examine the induction of magnetism in iron or steel by juxtaposition to a magnet, the general facts of which are mentioned and illustrated in N° 44.

It was remarked in N° 46, that the induction of magnetism in the iron by being near a magnet was not produced by a transference of something from the magnet to the iron. It follows that there must be some inherent property in iron, which is only excited, as it were, or roused into action, by the proximity of the magnet.

It has been remarked, that the magnetism of iron is momentary; but this must be understood only of the finest and purest iron, as when this metal is in the state of ore, or has undergone any change, as by exposure to the air, or by cementation, its magnetism becomes permanent, in proportion to the hardness of the metal.

90 Induced magnetism gradual. It is of great importance to observe that the acquisition of induced magnetism is gradual and progressive, and that this gradation is more perceptible according as the iron is in a harder state. In soft iron the induction appears to be instantaneous throughout, unless the bar be exceedingly long; but when a magnet is brought near a bar of tempered steel, the near end acquires a contrary polarity long before the remote end appears affected, and it is a long time before the remote end acquires the same polarity with the proximate end of the magnet.

91 Iron attracted only because it becomes magnetical. From what has been said we may infer, that a piece of iron brought near a magnet, is attracted only because it becomes magnetical by induction, and that the attraction of a loadstone for iron, or the tendency of iron to the loadstone, is the consequence of the proper disposition of the magnetism induced in the iron. It has already appeared, that this phenomenon arises from the excess of two attractions above two repulsions, and this is farther proved by the following considerations: 1. That the magnetism of the two poles is evidently of an opposite nature, the one attracting what the other repels, and *vice versa*. If a piece of iron is attracted by one, it ought therefore to be repelled by the other; but each pole, by inducing on the near end of the iron a magnetism opposite to its own, and on the remote end a similar magnetism, and its action diminishing as the distance increases, the attraction must always be in excess, and the iron must on the whole be attracted. 2. When we have two magnets placed in a parallel position, with their opposite poles together, if a piece of common iron be brought near their extremities, the different poles counteracting each other, the piece of iron will not be supported by the two magnets together, unless there is an inequality of action; but it is evident that either of them alone would be capable of supporting the iron. 3. In all the cases where the induction of magnetism is slow, the attraction is proportionally weak, and the attraction increases exactly according to the increase of the progressive induction. 4. An ore of iron that is not capable of acquiring magnetism, is not attracted by the magnet, and on the other hand it is an universal fact, that no substance which is not attracted by the magnet, can be rendered magnetical. Theory.

92 Arrangement of iron filings explained. The induction of magnetism by juxtaposition affords a complete explanation of the curious arrangement of iron filings round a magnet. Let us suppose a great many small oblong pieces of iron to be lying near each other on the surface of mercury, and that a strong magnet be brought into the midst of them. They are all immediately rendered magnetical by induction; any one that is nearest the north pole of the magnet acquiring two poles, one a north and the other a south pole, turns the south pole towards the north pole of the magnet, and the north pole away from it; a similar effect is produced on another piece or filing that lies near the first, and so on of the rest. All those that lie near each other must mutually attract, as the magnetism of each is so disposed that both ends of it are in a state of attraction towards one or other of its neighbours. They will therefore arrange themselves by coalescence in a particular manner; if they are near enough, they will unite by their extremities, and if they are at some distance they will point towards each other, forming curved lines.

93 Magnetism can be reversed. It is found that the magnetism of magnets, whether natural or artificial, is continually tending to decay. Now as we find that this magnetism may be induced merely by the approach of a magnet, and as we know that in producing magnetism, magnets may oppose each other, it is reasonable to conclude, that when a slight though permanent magnetism has been acquired by a piece of iron by its vicinity to a magnet, it may be destroyed, and the contrary magnetism induced, by applying a magnet in the opposite direction. Accordingly it is a well-known fact, that the poles of magnets made of soft steel can be reversed at pleasure.

This explains why magnetic repulsion is always weaker than attraction at the same distance, as magnets, when placed with their similar poles fronting each other, in order to try their repulsion, are thereby weakened; whereas, on the contrary, magnets applied with their opposite poles, so as to attract each other, are thereby improved, and their attractive powers are made to appear greater than they really are.

It has been observed that a magnet is not weakened by inducing magnetism on iron. In fact, it is rather improved

Theory. improved by such induction, and this will increase the effect; for as the magnet is improved, the induced magnetism of the iron will be thereby increased, and thus the magnet will be thus farther improved.

After what has been said, we need not enter further into an explanation of the phenomena, or of the processes employed in making artificial magnets. They are all referable to this one fact of the induction of magnetism by juxtaposition, and explanations will readily suggest themselves to readers who carefully consider the preceding facts, and compare them with Dr Gilbert's theory of terrestrial magnetism.

94 Objection to terrestrial magnetism answered.

It is now time for us to return to Dr Gilbert's hypothesis, and consider an objection that has been strongly urged against it.

There is observed no tendency in the magnetic needle towards the great terrestrial magnet, that is, though, when made to float on water, it speedily acquires directive power, it does not in these latitudes approach the north side of the vessel, nor does an iron bar appear heavier when its south pole is uppermost, as ought to be the case on account of the attraction of the great magnet. Dr Gilbert saw this objection, and it appears to have given him some concern. He attempted to get rid of it by observing that the directive power of a magnet is greater than its attractive force; a fact in support of which he brings many experiments. A much more satisfactory answer may be derived from what has been stated respecting the actions of the four poles. We thence find, that the polarity of the needle depends on the difference of the *sums* of the actions of each pole of the magnet on both poles of the needle; whereas its tendency towards the magnet arising from the attraction between them, depends on the difference of the *differences* of the same actions. Hence the former may be very great, while the latter is very small. We find that small iron filings are much less forcibly attracted by magnets than coarse ones, and, if we consider that the largest magnets which we employ do not bear so great a proportion to the earth, as the finest iron filings to an ordinary magnet, we shall not wonder that the attractive power of the earth is not very sensible.

As this objection is one of the strongest that can be brought against the theory, and as we may consider this as done away, we may now receive the theory as just so far as it goes. We must remark, that though we call that pole of a magnet which inclines towards the earth in the northern latitudes, a *north* pole, it is properly speaking a *south* pole; for as we must call that pole of the *great* magnet the north pole which is in the north, and as this pole produces the contrary polarity in the proximate end of a needle, that end must be possessed of *south* polarity. We shall return to this subject in the article VARIATION.

Some valuable observations on terrestrial magnetism have lately been made in France by M. M. Humboldt and Biot, and as they would suffer materially by abridgement, we shall present our readers with the greatest part of the memoir nearly as translated in the Philosophical Magazine, vol. xxii.

95 Observations of Humboldt and Biot.

After explaining the object of the memoir, and giving an account of the share that he had in conducting the observations, M. Biot proceeds as follows.

It is necessary to consider the action of terrestrial magnetism under different points of view, corresponding to the different classes of the phenomena which it produces. Theory.

96 Magnetism acts on the whole surface of the globe.

If we consider it first in general, we find that it acts on the whole surface of the globe, and that it extends beyond it. This fact, which was doubted, has been lately proved by M. Guy-Lussac, during his two aërostatic voyages. And if these observations, made with all the care possible, have not shewn the least sensible diminution in the intensity of the magnetic force, at the greatest height to which man can attain, we have a right to conclude that this force extends to an indefinite distance from the earth, where it decreases, perhaps, in a very rapid manner, but which at present is unknown to us.

If we now consider magnetism at the surface even of the earth, we shall find three grand classes of phenomena which it is necessary to study separately, in order to have a complete knowledge of its mode of action. These phenomena are, the declination of the magnetic needle, its inclination, and the intensity of the magnetic force, considered either comparatively in different places or in themselves, paying attention to the variations which they experience. It is thus that, after having discovered the action of gravity as a central force, its variation, resulting from the figure of the earth, was afterwards ascertained in different latitudes.

The declination of the magnetic needle appears to be that phenomenon which hitherto has more particularly fixed the attention of philosophers, on account, no doubt, of the assistance which they hoped to derive from it in determining the longitude; but when it was known that the declination changes in the same place, in the course of time, when its diurnal variations were remarked, and its irregular traversing occasioned by different meteors, in a word, the difficulty of observing it at sea, within one degree nearly, it was necessary to abandon that hope, to consider the cause of these phenomena as much more complex and abstruse than had been at first imagined.

97 Magnetic power increases from the equator to the poles.

In regard to the intensity of the magnetic power in different parts of the earth, it has never yet been measured in a comparative manner. The observations of M. Humboldt on this subject have discovered a very remarkable phenomenon; it is the variation of the intensity in different latitudes, and its increase proceeding from the equator to the poles.

The compass, indeed, which at the departure of M. Humboldt gave at Paris 245 oscillations in 10 minutes, gave no more in Peru than 211, and it constantly varied in the same direction; that is to say, the number of the oscillations always decreased in approaching the equator, and always increased in advancing towards the north.

These differences cannot be ascribed to a diminution of the force in the magnetism of the compass, nor can we suppose that it is weakened by the effect of time and of heat; for after three years residence in the warmest countries of the earth, the same compass gave again in Mexico oscillations as rapid as at Paris.

There is no reason to doubt the justness of M. Humboldt's observations, for he often observed the oscillations in the vertical plane perpendicular to that meridian; and by decomposing the magnetic force in the

Theory. the latter plane, and comparing it with its total action, which is exercised in the former, we may from these data calculate its direction, and consequently the direction of the needle (c). This inclination, thus calculated, is found always conformable to that which M. Humboldt observed directly. When he made his experiments, however, he could not foresee that they would be subjected to this proof by which M. Laplace verified them.

As the justness of these observations cannot be contested, we must allow also the truth of the result which they indicate, and which is the increase of the magnetic force proceeding from the equator to the poles.

93 Humboldt's determination of the magnetic equator. To follow these results with more facility, it will be proper to set out from a fixed term; and it appears natural to make choice for that purpose of the points where the inclination of the magnetic needle is null, because they seem to indicate the places where the opposite action of the two terrestrial hemispheres is equal. The series of these points forms on the surface of the earth a curved line, which differs very sensibly from the terrestrial equator, deviating from it to the south of the Atlantic ocean, and to the north in the south sea. M. Humboldt found this equator in Peru about 7° 1′ S. Lat. which for that part of the earth places it nearly in the spot where Wilke and Lemounier had fixed it.

The places situated to the north of that point may be divided into four zones, the three first of which, being nearer the equator, are about 4° of latitude, while the latter, more extensive and more variable, is 14°. So that the system of these zones extends in America from the magnetic equator to 23° of north latitude, and comprehends in longitude an internal of about 50°.

The first zone extends from 7° 1′ of south latitude to 2° 54′. The mean number of the oscillations of the needle in the magnetic meridian in 10′ of time is there 211.9: no observation gives less than 211, or more than 214. From M. Humboldt's observations one might form a similar zone on the south side of the magnetic equator, which would give the same results.

The second zone extends from 2° 13′ of south latitude to 3° 15′ of north latitude. The mean term of the oscillations is there 217.9; they are never below 220, nor above 226. Theory.

The fourth zone, broader than the other two, extends from 9° 15′ to 23° 8′ of north latitude. Its mean term is 237: it never presents any observation below 229, nor above 240.

We are unacquainted, in regard to this part of the earth, with the intensity of the magnetic force beyond the latitude of 23° north; and on the other hand, in Europe, where we have observations made in high latitudes, we have none in the neighbourhood of the equator; but we will not venture to compare these two classes of observations, which may belong to different systems of forces, as will be mentioned hereafter.

However, the only comparison of results, collected in America by M. Humboldt, appears to us to establish with certainty the increase of the magnetic force from the equator to the poles; and, without wishing to connect them too closely with the experiments made in Europe, we must remark, that the latter accord so far also with the preceding as to indicate the phenomenon.

If we have thus divided the observations into zones parallel to the equator, it is in order that we may more easily shew the truth of the fact which results from them, and in particular to render the demonstration independent of those small anomalies which are inevitably mixed with these results.

Though these anomalies are very trifling, they are however, so sensible, and so frequently occur, that they cannot be ascribed entirely to errors in the observations. It appears more natural to ascribe them to the influence of local circumstances, and the particular attractions exercised by collections of ferruginous matters, chains of mountains, or by the large masses of the continents.

One of them, indeed, having carried to the Alps the magnetic needle employed in an aërial excursion, he found that its tendency to return to the magnetic meridian was constantly stronger in these mountains than it was at Paris before his departure, and than it has been found since his return. This needle, which made at Paris 83.9° in 10′ of time, has varied in the following manner in the different places to which it was carried.

(c) Let HOC (fig. 28.) be the plane of the magnetic meridian passing through the vertical OC; let OL be the direction of the needle situated in that plane, and OH a horizontal. The angle LOH will be the inclination of the needle, which we shall denote by I. If F represent the total magnetic force which acts in the direction OL, the part of this force which acts according to OC, will be F sine of I: but the magnetic forces which determine the oscillations of the needle in any plane, are to each other as the squares of the oscillations made in the same time. If we denote them by M, the number of oscillations made in 10′ of time in the magnetic meridian, and by P, the number of oscillations made also in 10′, in the perpendicular plane, we shall have the following proportion:

$$\frac{F \sin. I}{F} = \frac{P^2}{M^2}$$

from whence we deduce

$$\text{Sin. } I = \frac{P^2}{M^2}.$$

The inclination then may be calculated by this formula, when we have oscillations made in the same planes.

In like manner, by making a needle oscillate successively in several vertical planes, we might determine the direction of the magnetic meridian.

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Places of Observation.	*Number of Oscillations in 10′ of Time.*
Paris, before his departure,	83.9
Turin,	87.2
On Mount Genêvre,	88.2
Grenoble,	87.4
Lyons,	87.3
Geneva,	86.5
Dijon,	84.5
Paris, on his return,	83.9

99 Terrestrial magnetism modified by local circumstances.

These experiments were made with the greatest care, conjointly with excellent observers, and always employing the same watch verified by small pendulums, and taking the mean terms between several serieses of observations, which always differed very little from each other. It appears thence to result, that the action of the Alps has a sensible influence on the intensity of the magnetic force. M. Humboldt observed analogous effects at the bottom of the Pyrenees; for example, at Perpignan. It is not improbable that they arose from the mass of these mountains, or the ferruginous matters contained in them; but whatever may be the cause, it is seen by these examples that the general action of terrestrial magnetism is sensibly modified by local circumstances, the differences of which may be perceived in places very little distant from each other. This truth will be further confirmed by the following observations.

It is to causes of this kind, no doubt, that we must ascribe the diminution of the magnetic forces observed in some mountains; a diminution which, on the first view, might appear contrary to the results obtained during various aërial voyages. This conjecture is supported by several observations of M. Humboldt. By making his needle to oscillate on the mountain of Guadaloupe, which rises 338 toises above Santa-Fé, he found it in 10′ of time give two oscillations less than in the plain. At Silla, near Caracas, at the height of 1316 toises above the coast, the diminution went so far as five oscillations; and on the other hand, on the volcano of Antisana, at the height of 2467 toises, the number of oscillations in 10 minutes was 230; though at Quito it was only 218, which indicates an increase of intensity. A similar effect was observed on the summit of Mount Genevre, at the height of 800 or 900 toises, as may be seen from the numbers already given; and on this mountain M. Biot found the greatest intensity of the magnetic force. He saw on the hill of La Superga, in the neighbourhood of Turin, an example of these variations equally striking. Observing, with Vassali, on this hill, at the elevation of 300 toises, they found 87 oscillations in 10 minutes of time. On the side of the hill they had 88,8 oscillations, and at the bottom, on the bank of the Po, they obtained 87.3. Though these results approach very near to each other, their difference is, however, sensible, and fully shows that their small variations must be considered as slight anomalies produced by local circumstances.

This examination leads us to consider the intensity of magnetism on the different points of the surface of the globe, as subject to two sorts of differences. One kind are general; they depend merely on the situation of the places in regard to the magnetic equator, and belong to a general phenomenon, which is the increase of the intensity of the magnetic forces in proportion as we remove from the equator; the other kind of variations, which are much smaller and altogether irregular, seem to depend entirely on local circumstances, and modify either more or less the general results. Theory.

If we consider terrestrial magnetism as the effect of an attractive force inherent in all the material particles of the globe, or only in some of these particles, which we are far from determining, the general law will be, the total result of the system of attraction of all the particles, and the small anomalies will be produced by the particular attractions of the partial systems of the magnetic moleculæ diffused irregularly around each point; attractions rendered more sensible by the diminution of the distance.

It now remains to consider the inclination of the magnetic needle in regard to the horizontal plane. It has been long known that this inclination is not every where the same; in the northern hemisphere the needle inclines towards the north; in the southern towards the south; the places where it becomes horizontal form the magnetic equator; and those where the inclination is equal, but not null, form on each side of that equator curved lines, to which the name of magnetic parallels has been given, from their analogy to the terrestrial parallels. One may see in several works, and particularly in that of Lemounier, entitled *Lois du Magnetisme*, the figure of these parallels, and their disposition on the face of the earth.

100 Inclination of the needle increases as we proceed from the magnetic equator.

It evidently results from this disposition, that the inclination is in proportion as we recede from the magnetic equator; but the law which it follows in its increase, has not yet, as far as appears to us, been given. To ascertain this law, however, would be of great utility; for the inclination seems to be the most constant of all the magnetic phenomena, and it exhibits much fewer anomalies than the intensity. Besides, if any rule well confirmed could be discovered on this subject, it might be employed with advantage at sea to determine the latitude, when the weather does not admit an observation of the sun; which is the ease in various places during the greater part of the year. We have some reason to expect this application, when we see the delicacy of that indication in the observations of M. Humboldt, where we find 35′ 6″ of difference between two towns so near each other as Nismes and Montpellier. These motives have induced us to study with great interest the series of observations made by M. Humboldt in regard to the inclination; and it appears to us that they may be represented very exactly by a mathematical hypothesis, to which we are far from attaching any reality in itself, but which we offer merely as a commodious and sure mode of connecting the results.

To discover this law, we must first exactly determine the position of the magnetic equator, which is as an intermediate line between the northern and the southern inclinations. For this purpose we have the advantage of being able to compare two direct observations, one of La Perouse, and the other of M. Humboldt. The former found the magnetic equator on the coasts of Brasil at 10° 57′ of south latitude, and 25° 25′ of west longitude, counted from the meridian of Paris. The latter found the same equator in Peru at 7° 1′ of south latitude, and 80° 41′ of west longitude, also reckoning from the same meridian. These data are sufficient

Theory. cient to calculate the position of the magnetic equator, supposing it to be a great circle of the terrestrial sphere; an hypothesis which appears to be conformable to observations. The inclination of this plane to the terrestrial equator is thus found to be equal to 10° 58′ 56″, and its occidental node on that equator is at 120° 2′ 5″ west from Paris, which places it a little beyond the continent of America, near the Gallipagos, in the South sea; the other node is at 59° 57′ 55″ to the east of Paris, which places it in the Indian seas (D).

"We do not give this determination as rigorously exact; some corrections might no doubt be made to it, had we a greater number of observations equally precise; but we are of opinion that these corrections would be very small, and it will be seen afterwards that, independently of the confidence which the two observations we have employed deserve, we have other reasons for entertaining this opinion (E).

"It is very remarkable that this determination of the magnetic equator agrees almost perfectly with that given long ago by Wilke and Lemounier. The latter in particular, who for want of direct observations had discussed a great number of corresponding observations, indicates the magnetic equator in Peru towards 7° 20′ of south latitude, and M. Humboldt found it in the same place at 7° 1′; besides, Lemounier's chart, as well as that of M. Wilke, indicates for the inclination of the magnetic meridian about 11°, and they place the node about 140° of west longitude, reckoned from the meridian of Paris.

"Can it be by chance, then, that these elements, found more than 40 years ago, should accord so well with ours founded on recent observations? or does the inclination of the magnetic equator experience only very small variations, while all the other symptoms of terrestrial magnetism change so rapidly? We should not be far from admitting the latter opinion, when we consider that the inclination of the magnetic needle has changed at Paris 3° in 60 years since it has been observed; and that at London, according to the observations of Mr Graham, it has not changed 2° in 200 years, while the declination has varied more than 20° in the same interval, and has passed from east to west: but on the other hand the observation of the inclination is so difficult to be made with exactness, and it is so short a time since the art of measuring it with precision was known, that it is perhaps more prudent to abstain from any premature opinion on phenomena, the cause of which is totally unknown to us." Theory.

To employ the other observations of M. Humboldt in regard to the inclination, the terrestrial latitudes and longitudes reckoned from the magnetic equator were first reduced. The latter, being reckoned from the node of that equator in the South sea, M. Biot first perceived by these calculations that the position of that plane determined by preceding researches was pretty exact; for some of the places, such as Santa-Fé and Javita, where M. Humboldt observed inclinations almost equal, were found nearly on the magnetic parallel, though distant from each other more than 60° of longitude.

When these reductions were made, M. Biot endeavoured to represent the signs of the inclinations observed, and to leave as little to chance as possible. He first tried a mathematical hypothesis conformable enough to the idea which has hitherto been entertained in regard to terrestrial magnetism.

He supposed in the axis of the magnetic equator, and at an equal distance from the centre of the earth, two centres of attractive forces, the one austral and the other boreal, in such a manner as to represent the two opposite magnetic poles of the earth. He then calculated the effect which ought to result from the action of

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(D) To calculate this position, let NEE′ (fig. 29.) be the terrestrial equator; NHL the magnetic equator, supposed also to be a great circle, and HL the two points of that equator, observed by Messrs Humboldt and La Perouse. The latitudes HE, LE′, and the arc EE′, which is the difference of longitude of these two points, is known; consequently, if we suppose HE=b, LE′=b', EE′=v, EN=x, and the angle ENH=y, we shall have two spherical triangles NEH, NE′L, which will give the two following equations:

$$\text{sin. } x = \frac{\text{tang. } b \text{ cot. } y}{R} \text{ sin. } (x+v) = \frac{\text{tang. } b' \text{ cot. } y}{R};$$

from which we deduce

$$\text{sin.} \frac{(x+v)}{\text{sin. } x} = \frac{\text{tang. } b'}{\text{tang. } b},$$

and developing

$$\text{cot. } x = \frac{\text{tang. } b \text{ sin. } v}{\text{tang. } b'} - \frac{\text{cos. } v}{\text{sin. } v}.$$

Let us now take an auxiliary angle φ, so that we may have

$$\text{tang. } \varphi = \frac{\text{tang. } b \text{ sin. } v}{\text{tang. } b'}, \text{ and we shall have}$$

$$\text{tang. } x = \frac{\text{sin. } v \text{ sin. } \varphi}{\text{sin. } (v - \varphi)}.$$

By these equations we may find x, and then y, by any of the first two.

(E) La Perouse, after having doubled Cape Horn, fell in a second time with the magnetic equator in 18′ north latitude, and 119° 7′ of longitude west from Paris. He was therefore very near the node of the magnetic equator, such as we have deduced it from observations. This fact establishes in a positive manner two important consequences: First, that the preceding determinations require only very slight corrections; and the second, that the magnetic equator is really a great circle of the earth, if not exactly, at least very nearly.

Theory.

of these centres in any point of the surface of the earth, making their attractive force reciprocally vary as the square of the distance; and in this manner he obtained the direction of the result of their forces, which ought to be that also of the magnetic needle in that latitude.

Fig. 30.

He supposes that the point B (fig. 30.) is the north magnetic pole of the earth, and that the point A is the south magnetic pole; he supposes also that there is in the point M, at the surface of the earth, a molecula of the austral fluid which is attracted by B and repelled by A in the inverse ratio of the square of the distance; and he requires what will be the direction of the power resulting from these two forces acting on that molecula. It is evident that this direction will be that also which would be assumed in the point M by the needle of a compass freely suspended; for, in consequence of the smallness of the needle in comparison of the radius of the earth, the lines drawn from its points to one centre, B or A, may be considered as parallel, especially if the points A and B are near the centre of the earth, which is the case with nature, as may be seen.

He first supposes that the earth has a spherical figure, and that the two poles A and B are equal in force, and he then examines how far the latter supposition agrees with the results observed.

Let AM then $= D'$, $BM = D$, $CP = x$, $PM = y$, the angle $MCP = u$, $CA = CB = a$. He then makes $a = Kr$; r being $=$ the radius of the earth, and K a constant but indeterminate quantity.

Let X, Y, also be the forces which attract M in the direction of the axes of the co-ordinates, and β the angle which the resulting force makes with the axis ABC.

Theory.

He then gives the following equations, in which F is the magnetic force, at a distance equal to unity.

$$x = \frac{F}{D^2}\cos.\,MBD - \frac{F}{D'^2}\cos.\,MAD;$$

$$D'^2 = y^2 + (x+a)^2 = r^2 + 2\,axis + a^2,$$

$$Y = \frac{F}{D^2}\sin.\,MBD - \frac{F}{D'^2}\sin.\,MAD;$$

$D^2 = y^2 + (x-a)^2 = r^2 - 2\,axis + a^2$, or, by putting for the cosines their values:

$$X = \frac{F(x-a)}{D^3} - \frac{F(x+a)}{D'^3}$$

$$Y = \frac{Fy}{D^3} - \frac{Fy}{D'^3},$$

and as we have

$$\text{tang. } \beta = \frac{Y}{X},$$

we shall have also

$$\text{tang. } \beta = \frac{\dfrac{Y}{D^3} - \dfrac{Y}{D'^3}}{\dfrac{x-a}{D^3} - \dfrac{x+a}{D'^3}} = \frac{y(D'^3 - D^3)}{(D'^3 - D^3) - a(D'^3 + D^3)};$$

and by putting for x, y and a, their values, cos. u; r sin. u, K r;

$$\text{tang. } \beta = \frac{\sin.\,u}{\cos.\,u - K\left(\dfrac{D'^3 + D^3}{D'^3 - D^3}\right)},$$

$$D'^2 = r^2(1 + 2K\cos.\,u + K^2);$$
$$D^2 = r^2(1 - 2K\cos.\,u + K^2);$$

which gives the system of the two equations,

$$\text{tang. } \beta = \frac{\sin.\,u}{\cos.\,u - K\left(\dfrac{D'^3 + D^3}{D'^3 - D^3}\right)},$$

$$K\left(\frac{D'^3 + D^3}{D'^3 - D^3}\right) = \frac{(1 + 2K\cos.\,u + K^2)^{\frac{3}{2}} + (1 - 2K\cos.\,u + K^2)^{\frac{3}{2}}}{(1 + 2K\cos.\,u + K^2)^{\frac{3}{2}} - (1 - 2K\cos.\,u + K^2)^{\frac{3}{2}}}K.$$

These equations determine the direction of the magnetic needle in regard to each point M, the distance of which from the magnetic equator is known; but it is seen that this direction depends on the quantity K, which represents the distance of the magnetic centres from the centre of the earth; this distance being expressed in parts of the terrestrial radius, we must therefore first determine this quantity from observations.

To do it in the manner of approximation, and thus acquire a first idea of the value of K, M. Biot chose an observation made by M. Humboldt at Carichana in 6° 34′ 5″ of north latitude counted from the terrestrial equator, and 70° 18′ west longitude reckoned from the meridian of Paris, which gives 14° 52′ 25″ of longitude counted from the magnetic equator, and 48° 51′ 53″ of west longitude, proceeding from the node formed by that equator with the equator of the earth. The inclination of the magnetic needle was observed in that place by M. Humboldt in the month of Messidor, year 8, and found to be equal to 33.78° of the centigrade division. A comparison of this result with the other observations of M. Humboldt, shews that it may indeed be considered as agreeing to that latitude.

To make use of it, M. Biot successively gave to K different values in the formula; he calculated the inclinations resulting from that latitude; and comparing these results with that which M. Humboldt really observed, the progress of the errors naturally led him to the most proper supposition. The following is a table of these trials.

Values of K.	Inclinations of the Needle.	Errors.
K=1	7.73°	26.04
K=0.6	18.80	14.97
K=0.5	22.04	11.73
K=0.2	29.38	4.39
K=0.1	30.64	3.13
K=0.01	31.04	2.73
K=0.001	31.07	2.7

The first value of K would place the centre of the magnetic forces at the surface of the earth and the poles of the magnetic equator. It is seen that this supposition cannot be admitted, because it would give an increase of inclination much less rapid than that indicated by observations. The case is the same with the following

Theory. following results, which place the centres of action on the terrestrial radius at different distances from the centre of the earth; but it is seen also in general, that they approach more and more to the truth in proportion as this distance becomes less; which evidently shews that the two centres of action of the magnetic forces are situated near the centre of the earth. All the other observations of M. Humboldt would also lead to the same consequence.

The most proper supposition would be to make K null, or so small that it would be needless to pay attention to it; which amounts to the same thing as to consider the two centres of action placed, as we may say, in the same molecula. The result, indeed, obtained in this manner is the most exact of all; it is $=31.0843^{\circ}$; this value is still a little less than that which M. Humboldt observed, and the difference is $=2.69$; but it must be considered also that the formula from which we derive these values supposes the position of the magnetic equator is perfectly determined; but it may not be so with the utmost exactness, according to the two only observations of La Perouse and Humboldt, which we have employed. It is therefore by studying the progress of the formula, and comparing it with the observations, that we are able to appreciate it justly; after which we may think of remedying the small errors with which it may be accompanied.

To obtain the result here mentioned, and which is, as it were, the limit of all those which may be obtained by giving to K different values, it is to be remarked that the quantity

$$K\left(\frac{D^3+D^3}{D'^3-D^3}\right),$$

or,

$$K\frac{(1+2K\cos.u+K^2)^{\frac{3}{2}}+(1-2K\cos.u+K^2)^{\frac{3}{2}}}{(1+2K\cos.u+K^2)^{\frac{3}{2}}-(1-2K\cos.u+K^2)^{\frac{3}{2}}}$$

becomes $\frac{0}{0}$ when K is null; but by applying to it the methods of known quantities, it will be found that its value in this supposition is really determinate and $=\frac{1}{3\cos.u}$. By substituting this in the formula we shall have

$$\text{tang. }\beta=\frac{\sin.u}{\cos.u-\frac{1}{3\cos.u}}$$

an equation which may be reduced to this form:

$$\text{tang. }\beta=\frac{\sin.u}{\cos.2u+\frac{1}{3}};$$

which will easily give the value of β; and when this value is known, we shall have the inclination I, by the following formula:

$$I=100+u-\beta,$$

which will serve throughout the whole extent of the two hemispheres.

From the progress thus traced out, it is seen that the preceding formula is not merely an empyrie construction of observations; on the contrary, it is totally independent, and only supposes the inclination of the magnetic needle to be produced by a magnet infinitely small, placed in the centre of the terrestrial surface; but by calculating from this formula the inclination for the different latitudes, M. Biot found precisely the same numbers as M. Humboldt observed either in Europe or America; and it is not his observations only that are represented in this manner; but those which have been made in Russia, and at Kola in Lapland, during the last transit of Venus, are also comprehended under the same law. Theory.

It is seen that the results of the formula deviate very little from the observations; but these differences may be rendered still smaller. By examining, indeed, the progress of the errors, it is seen that the numbers given by calculation are a little too small in America for the low latitudes, and a little too great for the high latitudes, which shews that the whole may be allowed, with some slight modifications, either by changing, however little, the node and inclination of the magnetic equator, which two observations cannot determine with the utmost exactness, or by displacing ever so little our small magnet, leaving, however, its centre in the plane of the magnetic equator, and placing it in such a manner that it shall be a little nearer America than Europe. It is by these observations themselves, when we shall have a greater number, that we must be guided in these small corrections.

In a word, it must not be expected that we can represent in a rigorous manner, by a mathematical law, all the inclinations observed; for the phenomenon of the inclination, though more regular than the other magnetic effects, is not free from some anomalies; this may be easily seen on constructing the curve given by the observations themselves. Thus, for example, the inclination observed at Popayan is 0° 10′ greater than at St Carlos del Rio Negro, though the magnetic latitude of the latter is 3° 7′ greater. The case is the same with observations made at Javita and Santa Fé. Other anomalies are discovered in the comparative progress of the observations and formula. This is the case in regard to Carichana, St Thomas de la Guyane, and Carthagena. The increase of the inclination from the first to the second of these points is by no means in harmony with the increase from the second to the third; and if we compare together the intensities observed in these different places, the anomalies they exhibit announce in some measure those which the inclination ought to experience.

The cause of these anomalies becomes evident from what has been already remarked; they are merely the effect of local circumstances, and arise from the small systems of attraction by which the general phenomena are modified. This must be sensible in particular for that part of America which M. Humboldt travelled over, and which is traversed throughout its whole length by the grand chain of the cordillera of the Andes. It is also in these places that the most considerable differences exist. Popayan, for example, is situated near the volcanoes of Sotara and Pourace; it is joined to basaltic mountains abounding with magnetic iron. Near Sulumito, to the east of Popayan, these basaltic columns have very striking poles: in like manner Mexico is situated at the height of 1160 toises on the ridge of the grand cordillera of Lenschtitlan; the ground there is covered with porous basaltes and amygdaloids,

Theory. daloids, which are almost all charged with magnetic iron. Must not all these causes have a sensible influence on the inclination of the magnetic needle; and must not the different dispositions of the ferruginous masses, or their change of state, in consequence of the action of nature, produce also variations? M. Humboldt made on this point a decisive observation: the earthquake of the 4th November 1799 changed at Cumana the inclination of the needle. On the 1st of November it was 43° 65′; on the 7th it was only 42° 75′, and ten months after it returned to 42° 85′, but it did not regain its former value; the intensity of the magnetic force was not changed by the effect of this earthquake.

It is proved, then, by these observations, that local circumstances may have on the inclination a sensible influence; and this influence is remarked in the countries traversed by M. Humboldt.

It appears, therefore, that the mathematical hypothesis which we have employed really expresses the law of nature, at least to the north of the magnetic equator; for, though the first results observed towards the south seem to bend to it also, the uncertainty under which we are, in regard to the true cause of these phenomena, must stop our conjectures, and prevent us from extending too far the consequences of the laws which we observe (F).

From the preceding results, we may calculate the points where the axis of the magnetic equator pierces the terrestrial surface; for their latitudes are equal to the complements of the obliquity of that equator, and their meridian is at 100° of longitude from its nodes. The north magnetic pole is found also at 79° 1′ 4″ of north latitude, and at 30° 2′ 5″ of longitude west from Paris, which places it to the north of America. The other magnetic pole, symmetric to the preceding, is situated in the same latitude south, and at 149° 67′ 55″ of longitude east from Paris, which places it amidst the eternal ice; indications entirely analogous to those of Wilke and Lemonnier.

If we could reach these poles, the compass would be seen vertical; but if any confidence can be placed in the law which we have discovered, this would be the only difference which would be observed in regard to the inclination, and we should be still as far distant as in Europe from the real centres which produce it. This result might appear to be of such a nature as to diminish the interest one might have in visiting these horrid regions, had we not also the hope of discovering there new phenomena in regard to the intensity of the magnetic force, and the influence of meteors.

These consequences do not entirely accord with the opinion pretty generally received, and which ascribes the increase of the magnetic effects towards the north to the great quantity of iron dispersed throughout these regions; but it appears to us that this opinion is not agreeable to the truth. The cordillera of the Andes contains an enormous quantity of magnetic iron; the native iron of Chaco, that problematic mass analogous to that of Pallas, and those of Xacatares in Mexico, is found even under the tropics. Theory.

On seeing the inclinations of the compass so exactly represented in the hypothesis, they endeavoured to discover whether it could be applied to the intensities observed by M. Humboldt; but they found that it did not apply. It gives indeed, an increase of the magnetic forces from the equator to the pole; but this increase, which at first is too slow, becomes afterwards too rapid. M. Biot has not yet been able to try whether the small displacement of the terrestrial magnet will contribute towards representing them better; but it must be remarked, that the series of the intensities is extremely whimsical, and contains an infinite number of anomalies, so that local phenomena may have on this phenomenon a much more sensible influence than on the inclination.

On reviewing the results which have been given, it is seen that we have first determined the position of the magnetic equator by direct observations, which had never been done before; we have then proved that the magnetic force increases in proceeding from that equator to the poles; in the last place, we have given a mathematical hypothesis, which, when reduced to a formula, satisfies all the inclinations hitherto observed.

Supposing, as has been done in this formula, the small corrections of which it is susceptible, its utility becomes evident, either for making known, in the course of time, the variations which may take place in the action of the terrestrial magnetism, or to ascertain or even foresee the value of the inclination, which in a great many cases is of the utmost importance.

For example, near the magnetic equator, the increase or diminution of the inclination will indicate to a vessel on a voyage whether she has gained or lost in latitude by currents. This knowledge of the latitude is sometimes as important as that of longitude. On the coasts of Peru, for example, the currents tend from Chiloé to the north and north-east with such force, that one may go from Lima to Guayaquil in three or four days, and two, three, and sometimes five months are necessary to return. It is consequently of the greatest importance for vessels coming from Chili which stretch along the coast of Peru, to know their latitude. If they go beyond the port to which they are bound, they must work to the southward, and every day's progress requires often a month of return. Unfortunately, the fogs which prevail during four or five months on the coast of Peru, prevent

(F) Observations made at the Cape of Good Hope, Cape Horn, and New Holland, by different navigators, are very exactly represented by the above-mentioned formula; and it follows, that it extends also to the austral hemisphere. We hope soon to have numerous and very exact observations on the inclination of the needle in that part of the earth. But we have thought it our duty to add to our table such results as relate to it, and which we have been able to procure. We have inserted also two observations on the intensity, made with great care by M. Rossel, during the expedition of d'Entrecasteaux, which are very important, as they prove that the terrestrial magnetic force increases also in the austral hemisphere in proportion as one removes from the equator.

Theory. prevent navigators from distinguishing the form of the coast; nothing is seen but the summits of the Andes, and that of the peaks which rise above that stratum of vapours; but the figure of it is so uniform that pilots fall into mistakes. They often remain 12 or 15 days without seeing the sun or stars, and during that interval they come to anchor, being afraid of overshooting their port; but if we suppose that the inclination of the magnetic needle in the ports to the south of Lima is known, for example at Chancay, Huaura, and Santa, the dipping needle will show whether it be, in regard to Lima, to the south or to the north. It will show at the same time opposite what point of the coast a vessel is; and this indication will be attended with more exactness that one could hope for, because in these seas the inclination varies with extraordinary rapidity. M. Humboldt, to whom we are indebted for these remarks, observed in these seas the following values.

Places.	*South Latitudes.*	*Inclinations.*
Huanecy	10° 4′	6.80°
Huaura	11 3	9.00
Chancay	11 33	10.35

These observations prove that the error of three or four degrees in the inclination in these seas would produce but a degree of error in latitude; and, on account of the tranquillity of the Pacific ocean, the inclination may be observed to within a degree nearly. Frequent instances of such results may be seen in books of voyages. In like manner, if one knew exactly the inclination at the mouth of the Rio de la Plata, it would be very useful to navigators, who, when the Pamperos blow, remain 15 or 18 days without seeing the heavenly bodies, and go on different tacks for fear of losing the parallel of the mouth of that river.

In a word, the inclination may indicate also the longitude in these seas; and this method may be employed when others fail. A vessel which sails there in the direction of a parallel could not find its longitude either by a chronometer or the declination of Halley, unless a star could be seen, in order to take a horary angle or the magnetic azimuth. The dipping needle then throws light on the longitude amidst the thickest fogs. We point out this method as one of those which have only a local application; but hitherto little attention has been paid to it. These ideas may be extended and rectified by able navigators.

In general, if the inclination of the needle, and the law we have tried to establish, could be depended on, to observe the inclination and the terrestrial latitude would also be sufficient to determine the longitude; but we have not yet examined the extent of the errors of which this method may be susceptible, and consequently we confine ourselves to a mere indication of it.

The phenomenon of the inclination has in maritime observations a peculiar and very remarkable advantage, namely, that of not being subject to those great progressive variations which affect the declination. Without repeating what we have already said above on the supposed constancy of this phenomenon, it may be remarked that our formula even affords a new proof that it may comprehend in the same law the observations made many years ago in Lapland, those which Lacaille brought back in 1751 from the Cape of Good Hope, and those which M. Humboldt has lately made in America. Theory.

In short, when we tried to represent the inclinations in different latitudes by the supposition of a magnet infinitely small, very near the centre of the earth, and perpendicular to the magnetic equator, we did not pretend to consider that hypothesis as any thing real, but only as a mathematical abstraction useful to connect the results, and proper to ascertain in future whether any changes exist. In regard to the declination and intensity, we freely confess that we are entirely unacquainted with their laws or their causes; and if any philosopher is so fortunate as to bring them to one principle, which explains at the same time the variations of the inclination, it will no doubt be one of the greatest discoveries ever made. But this research, exceedingly difficult, requires, perhaps, before it be attempted, more observations, and in particular more precise observations, than have hitherto been collected. For this reason we have presented the preceding researches, imperfect as they are, hoping our readers will receive them with indulgence*.

* *Phil. Mag.* vol. xxii. 101

We would willingly have entered into a more full illustration of the theory of Æpinus, and compared it with the phenomena noticed in CHAP. II. but the important paper just given has taken up so much room, that this article is already extended to very nearly the utmost limits assigned to it. We must, therefore, content ourselves with giving some idea of the induction of magnetism by juxtaposition according to Æpinus's hypothesis, and must refer for the rest to his *Tentamen Theoriæ Electricitatis et Magnetismi*, or to the abridgement of it in Van Swinden's work *Sur l' Analogie de l'Electricité et du Magnetisme*, tom. ii.

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Induced magnetism by juxtaposition explained. Fig. 31.

Let NAS (fig. 31). be a magnet, of which the part next the north pole AN is overcharged, and let a bar of iron *s* B *n* be brought near the north pole of the magnet, so that their axes are in the same straight line. Now, in this theory, the overcharged pole N acts on the iron only by its redundant fluid, for that part of the fluid which is merely sufficient to saturate the iron will repel the fluid in B as much as the iron in AN attracts it, and of course can produce no change in B. In the same way SA acts on B merely by its redundant iron. Now, were the fluid in *s* B *n* immoveable, no sensible effect would be produced on it; but as it is supposed to be easily moveable, the redundant fluid in AN will have the effect of repelling it towards *n*, till the resistance met with there, added to its own tendency to diffuse itself uniformly, just balances the repulsion of AN. In the mean time, however, an attraction exists between the redundant iron in AS, and the fluid in B, by which the latter would be drawn from B *n*, and condensed in B *s*, the attraction opposing the repulsion above mentioned; but since AS is more distant from every point of B than AN from the same point, the redundant fluid will prevail, and on the whole the fluid will be condensed towards *n*, and rarefied towards *s*. The more diffused we suppose the fluid and iron in the magnet to be, the more removed will be the centres of effort of its poles from their extremities, the smaller will be the action, and the difference of action of AN and AS, and of course the smaller the condensation towards *n*, and the rarefaction towards *s*. From this we learn,

Theory. that, according as the poles of a magnet are more counteracted, the greater will be its power of action; and as this is agreeable to observation, it gives additional credit to the hypothesis.

Now, we see that the piece of iron *n* B *s* is attracted in consequence of its fluid being repelled towards its remote extremity, and distributed something like the fluid in NAS. In this hypothesis magnetism is supposed to depend entirely on the diffusion of magnetic fluid. The iron B has become a magnet, and by having magnetism induced on it, is attracted by the magnet A. In a similar way we might explain the action of the magnet, if its south or deficient pole were presented opposite to B.

103 Coulomb's theory. When the notion of a magnetic fluid was once entertained, it is not surprising that philosophers, reasoning from the analogy between electricity and magnetism, and the different effects arising from the south and north pole of a magnet, should be led to the idea of the magnetic fluid being compounded of two fluids. Accordingly the hypothesis of two magnetic fluids has long been a favourite on the continent, where it has been chiefly supported by Coulomb and Haüy. As the experiments and observations of the former philosopher entitle him to the highest respect, we shall here give a sketch of his theory of magnetism.

1. Coulomb admits of two magnetic fluids, one of which may be called the northern, and the other the southern fluid.

2. The particles of each of these two fluids are mutually repulsive of each other; that is, the particles of the fluid N mutually repel each other, and the particles of the fluid S repel each other.

3. There is a mutual attraction between the particles of one of these fluids and the particles of the other; or the particles of the fluid N attract and are attracted by the particles of the fluid S.

4. In the ordinary state of iron not magnetized, these two fluids are found mixed together, and hence a piece of ordinary iron under the usual circumstances exhibits no signs of magnetism.

5. In a magnetized body these two fluids are separated, and this separation takes place as soon as we begin to magnetize the body; one of the fluids N, retiring towards one extremity, and the other fluid S to the other extremity of the magnetized body.

6. The attraction and repulsion of two magnetic bodies, when they approach each other, is the result of the mutual action of the two fluids.

Suppose we have two needles A and B. If we make them approach each other on the side of the two poles of the same name, N or S, they will repel each other; but if they are made to approach on the side of different poles, as when the needle A presents its north pole to the south pole of the needle B, they will attract each other. Here there are four forces in action; 1. the fluid N of the needle A repels the fluid N of the needle B. 2. The same fluid N of the needle A attracts the fluid S of the needle B. 3. The fluid S of the needle A repels the fluid S of the needle B; and, 4. The fluid S of the needle A attracts the fluid N of the needle B. Now, if the extremity N of the needle A be very near the extremity S of the needle B, the mutual attraction between the two fluids N and S, will be stronger than the mutual repulsion between the two fluids N, N, and the two fluids S, S, and consequently the two needles will approach each other. Theory.

7. The attraction and repulsion of the two magnetic fluids is in the direct ratio of the masses, and in the inverse ratio of the distances.

This important part of the theory Coulomb deduces from a series of very delicate experiments made with his magnetic bars, similar to those by which he proved the same law to take place with respect to the action of the electric fluid. See ELECTRICITY, Part IV. chap. ii.

8. The magnetic fluid is entirely in the interior of magnetic bodies, for as the magnetic fluid moves with difficulty in the interior of a magnetic body, it cannot diffuse itself over the surface, which is the reason why filings of iron brought near a magnetic bar, remain attached to it.

9. Consequently magnetic bodies can have no magnetic atmosphere.

10. In a magnetic needle, the centres of magnetic action are near the extremities of the needle.

11. A magnetic needle being broken in any place, each of its parts is found to have two poles.

12. The forces which attract a needle towards one pole, are equal to those which draw it toward the other pole.

13. Magnetic bodies do not act on other bodies susceptible of magnetism, in any other way than by attraction or repulsion; for the magnetic fluid remains entirely within the interior of these bodies.

14. Magnetic attraction ought to be regarded as a particular power, analogous, however, to the power which we call universal gravitation, the only difference being, that gravitation acts very sensibly on all bodies, whereas magnetism acts most powerfully on iron.

15. This magnetic power or attraction is therefore a particular power produced neither by impulsion, nor by the action of any other fluid.

104 Coulomb's mode of ascertaining the magnetic dip. Though the instrument which is usually employed to measure the inclination of the magnetic needle is very simple in its construction, it is nevertheless liable to great errors, which in general arise from the almost absolute impossibility of placing the needle in all the positions it can take in equilibrium with regard to the effect of gravitation, that is to say, so that its centre of gravity may always exactly agree with the point on which it turns. When the dimensions are considerable, a new inconvenience arises from a degree of flexure, which, though scarcely sensible, is nevertheless productive of very great effects, from the slightest displacement of the centre of gravity producing a combination of the power of gravitation with that of magnetism.

To obviate these difficulties, Citizen Coulomb, instead of endeavouring to ascertain immediately, as has been hitherto done, the direction of the magnetic needle in the vertical plane which passes through the magnetical pole, conceives the force of this pole to be decomposed or resolved into two others in the same plane, the one acting in a horizontal, and the other in a vertical direction. He determines separately the intensity of each of these last forces, and the result gives the direction in which the magnetic force acts, and which a needle governed singly by this force would take.

Citizen

Theory. Citizen Coulomb has proved, in the Memoirs of the Academy of Sciences for the year 1789, that the magnetic needle suspended by its centre of gravity is incessantly brought back to its true direction by a constant force at the same place and time. It thence follows, that by observing the number of oscillations made in a given time by a needle horizontally suspended, the ratio of the horizontal component part of the magnetic power with gravity may be obtained. As to the vertical component part, it is measured by determining with care the weight necessary to be added to the southern part of the magnetic needle, to maintain it in a perfectly horizontal position. That being done, if A and B represent the respective measures of the horizontal and vertical component parts of the magnetic power, $\frac{B}{A}$ will be the tangent of the angle made by their result with the horizontal force, and, consequently, it will be the inclination of the magnetic needle.

In the experiments made by Citizen Coulomb, the needle had the form of a right-angled parallelopipedon, very thin in proportion to its breadth, and always suspended so that its breadth was kept in a vertical plane. Let P represent the weight of the needle, l the half of its length, λ the length of a pendulum that performs its oscillations in the same time as the needle when it obeys the magnetic power in a horizontal plane. Coulomb then gives the formula $\frac{P l}{3\lambda}$ to calculate the momentum of the magnetic force referred to the arm of a lever of one millimetre in length. The length of the needle was 427 millimetres, its breadth 13, and its weight 88,753 milligrammes. It was suspended horizontally by a thread of silk in a box well closed, and it made 30 oscillations in 286 seconds, and by applying these data to the preceding formula, Coulomb found that the logarithm of the momentum of the horizontal magnetic force is 4.1740.

Coulomb having placed his needle in a clip, having knife edges, which rested on two cylinders of glass, in the manner of the beam of a balance, endeavoured first to bring it to an equilibrium in a horizontal situation, coinciding with the magnetic meridian, by placing the edges in a proper manner, and when they were sufficiently near the point where the equilibrium took place, he completed it by the addition of small weights. He then reversed the poles of the needle by the magnetic touch, but without altering the position of the clip, and again bringing it to an equilibrium in this new state, the sum of the momenta of the additional weights placed in these two operations gave him the double of the momentum of the vertical component parts of the magnetic force, valued at $\frac{74467}{2}$. The result of this force, and of the horizontal force, is inclined 68° 9′.

In repeating these operations three times, Coulomb found successively 68° 9′, 68° 13′, and 68° 11′. Though the differences of these results are very trifling, he thinks they are to be entirely attributed to errors in the observation; for he is assured they do not amount to so much. It is possible that the needle is subject to variations in the vertical similar to those which are known to take place in the horizontal plane.

Theory. Daniel Bernoulli contrived an ingenious dipping needle that may answer the purpose of an universal instrument for making accurate observations on the dip. It depends on the following principle. If a dipping needle be made by an ordinary workman, and balanced with some care, so that when impregnated with magnetism, it may show nearly the true dip, and if it be touched, and the dip observed, then its magnetism destroyed, and its balance so altered, that without any magnetism it will take nearly the inclination of the true dip; and if it be then touched again, giving it the same polarity as it had before, it is evident that it will now approach very nearly to the true dip, since, by its want of perfect equilibrium, it was deranged only a few degrees from its proper direction. If the second observation of the dip should, from the inaccurate formation of the needle, differ considerably from the first, the operation must be repeated; and in this third observation there will very seldom be an error of more than half a degree. 105 Bernoulli's dipping needle.

Bernoulli's instrument is as follows. A very light graduated brass circle EFG (fig. 32.) is fixed on one side of the dipping needle, so as to be concentric with its axis, and the whole is balanced with as much nicety as may be, before being impregnated. CD is a very light index fixed to the axis in such a manner as to turn on it with some difficulty. By this the equilibrium of the needle will be destroyed. If great care has been taken in forming the instrument, and if it has been balanced with great accuracy, it will, by the addition of the index, be made to settle so as to have the index perpendicular to the horizon, at whatever degree of the circle the needle may happen to point. As such accuracy, however, is scarcely to be expected, let the index be set to several different degrees of the circle, and note the inclination taken by the needle before being magnetized, corresponding to each position of the index, and let all these be written down. For example, let us suppose that when the index is at 50°, the needle inclines 46° from the horizon; if we observe at any place that the needle, after being magnetized, inclines 46°, when the index is at 50°, we may be sure that the former is the true magnetic dip at that place, as the needle is not deranged by the magnetism that has been given it, from the situation it would assume by gravity alone. We usually know something of the dip that may be expected at any place. If we set the index accordingly, and if the needle does not then point out the expected dip; change the position of the index, and again observe the dip; examine whether this second position of the index and the second dip form a corresponding pair of numbers, such as we have written down; if they do, we have got the true dip, but if not, another position of the index must be tried. Thus, by noticing whether the agreement of this last pair be greater or less than that of the former pair of numbers, we learn whether we are to change the position of the index in the same or in the opposite direction. Fig. 32

A close analogy has long been remarked between the phenomena of magnetism and those of induced electricity, especially those of attraction and repulsion. The mechanical composition of these actions produces a directive power and polarity, both in electrical and magnetical bodies. It is easy to form an electrical needle that will 106 Analogy between electricity and magnetism.

Theory. arrange itself with respect to the overcharged and undercharged ends of a body electrified by position, just as a magnetic needle arranges itself with respect to the magnet. A stick of sealing wax may be touched in a manner similar to the double magnetic touch, so as to acquire poles of considerable force, and very durable. Again, melted sealing wax, when cooled in the neighbourhood of a positive and negative electric, acquires permanent poles, just as a red-hot steel bar acquires them by being quenched near a magnet. Lastly, lightning sometimes gives polarity to needles, sometimes destroys it, and sometimes reverses their polarity.

From these various circumstances of resemblance, some have supposed that both phenomena originate from the same cause, but there are several circumstances which show their original causes to be different. Thus, we find that electricity is common to all bodies, and can be excited or induced on all in a degree that is pretty nearly equal. Magnetism, on the contrary, though from Coulomb's experiments, it appears in some degree to affect all terrestrial bodies, acts, however, very imperceptibly on all but iron and its compounds. The action of lightning must not be considered as a proof of their identity, since that is accompanied with a great degree of heat, and we have already seen that this power, under favourable circumstances, is a very active agent, both in producing and destroying magnetism. Again, there is nothing in magnetism like a body being entirely overcharged, or entirely undercharged, as in electricity; but a magnetic body having two poles, must always be overcharged at one extremity, and undercharged at the other. There is nothing in magnetism resembling that inconceivably rapid motion which we see in electricity. In fine, the only perfect resemblance is between the induced magnetism of common iron, and the induced electricity of a conductor. On the arguments that have been employed for and against the identity of magnetism and electricity, our readers may consult Van Swinden, *Sur l'Analogie de l'Electricité et du Magnetisme*, and a tract by Æpinus *De Similitudine Electricitatis et Magnetismi*.

Some late experiments of Ritter tend to show a greater analogy than has yet been supposed, between magnetism and that modification of electricity which we call galvanism.

107 Ritter's experiments. Mr Ritter's first experiments with the magnet were on frogs. He found that a magnetic iron wire, with another not magnetic, excited a galvanic palpitation in these animals. Presently he observed, that the south pole excited stronger palpitations, and the north pole weaker, than the iron not magnetic. Having constantly noticed, that the metals most susceptible of oxidation excited the strongest palpitations, he inferred, that the south pole possesses a greater affinity for oxygen than simple iron, and the north pole less.

This supposition he confirmed by means of several chemical re-agents. He placed a magnetic iron wire on pieces of glass in a plate of earthen ware, and poured upon it a very weak nitric acid. The south pole was attacked by the acid much more powerfully than the north; and was soon surrounded by a deposition of oxygen, the quantity of which greatly exceeded that of the other pole.

The different oxidability of the magnetic pole is very well exhibited likewise, by taking three small bottles of equal size, filled with water, either purely or slightly acidulated, and putting into one the south polar end of a magnetic wire, into a second the north polar end of a similar wire, and into the third the end of an equal wire not magnetic; the south pole will first begin to deposit oxide, the unmagnetic iron a little after, and the north pole last. This experiment requires considerable care. The surface of the water must be covered with very fresh oil of almonds, to exclude all access of air. Care must be taken too, that one of the bottles is not more exposed to the sun than the others, because light accelerates oxidation. Ritter convinced himself of this by direct experiments; exposing two iron wires in water to the sun, but covering one of the phials with black paper, when that in the phial left uncovered was oxidated much more quickly. Theory.

If infusion of litmus be substituted instead of the water in the three phials in the preceding experiment, the relative oxidations will be the same, but they will be attended with a change of colour, showing that an acid is produced proportional to each oxidation; so that the south pole not only undergoes the greatest oxidation, but likewise reddens the infusion of litmus most. The action that takes place in this experiment is very feeble, and frequently requires a week to produce a distinct effect; and indeed to accelerate it so much as this, it is necessary to add, previously to the infusion, as much acetic acid as will incline it to red, without completely changing its colour. The infusion reddened in this experiment resumes its blue colour on exposure to the air; but we must not hence conclude, that the acid produced by the action of the magnet is very volatile, for infusion of litmus reddened by phosphoric acid, or any other, exhibits the same phenomenon.

The following experiment exhibits some things peculiar, and therefore we shall give it more at large. It has not been repeated, but the harmony of its results is in favour of its accuracy. Sixteen magnetic wires, of equal size and power, were placed in six vessels, all equally full of a mixture of one part nitric acid, and 36 parts water, in the following manner: in the first glass were placed two wires, one with the north pole immersed in the fluid, the other with the south, and not more than half a line asunder: in the second, the same, but the wires an inch and three-fourths apart: in the third and fourth were each three wires, with the south poles of all immersed, but their distances in the two glasses different, as in the first and second: in the fifth and sixth were wires similarly arranged, but with the north poles immersed. Different quantities of oxide were gradually deposed, and to express the whole in few words, we will call the south pole S, the north pole N, their greater distance g, and their less p, and we will express the order of oxidations as follows: $SNg > SNp > 3\,Sp > 3\,Sg > 3\,Np > 3\,Ng >$. On the nineteenth day it was observed, that the loss of fluid by evaporation had not been equal in all the vessels, but took place in the inverse order of the oxidations. All the magnetic wires were weakened in power; NSg least; NSp more: of the wires $3\,Sp$, two had lost less power than the third; and in like manner $3\,Sg$, $3\,Np$, $3\,Ng$, had each two left more powerful than the third; the strongest were equal to NSg.

In

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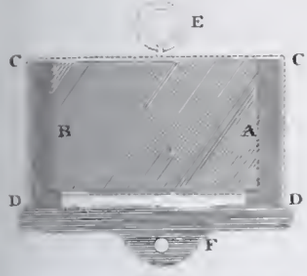

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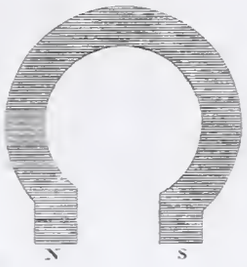

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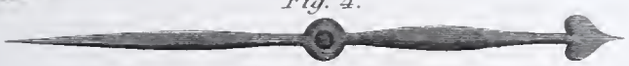

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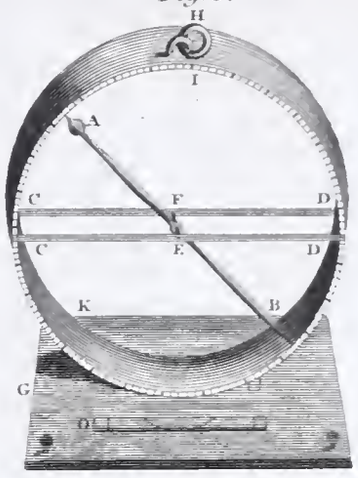

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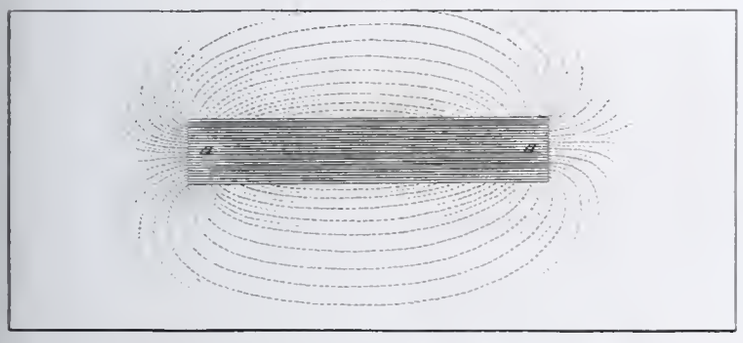

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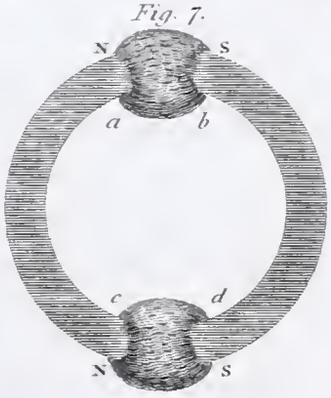

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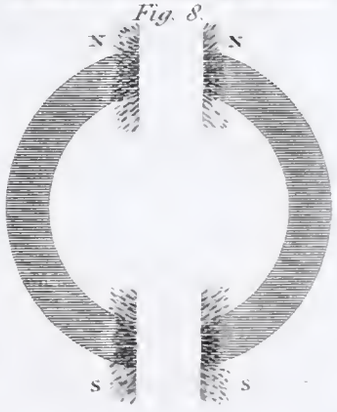

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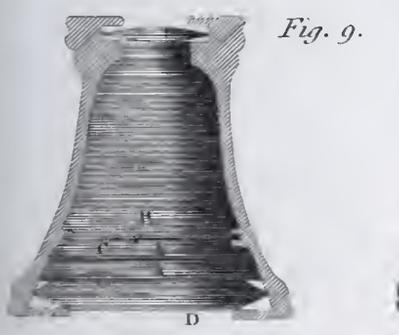

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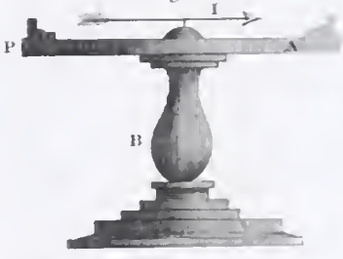

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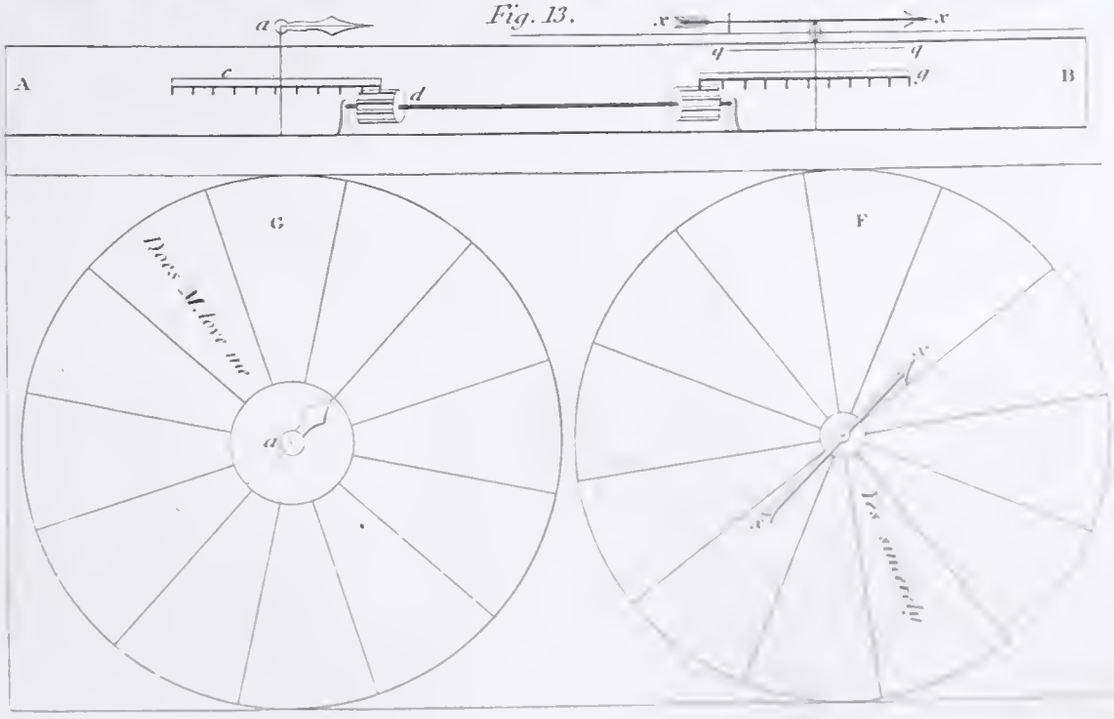

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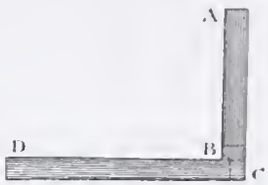

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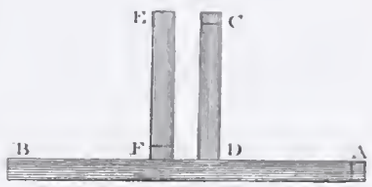

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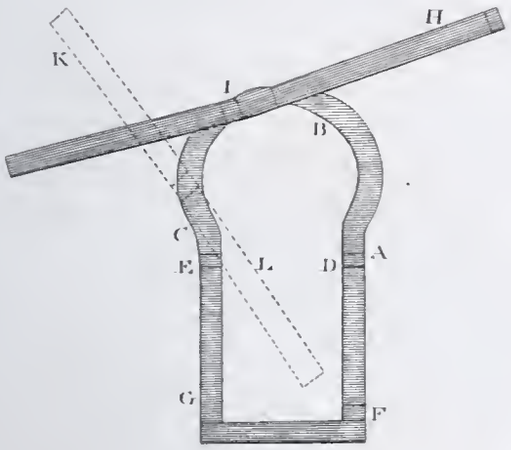

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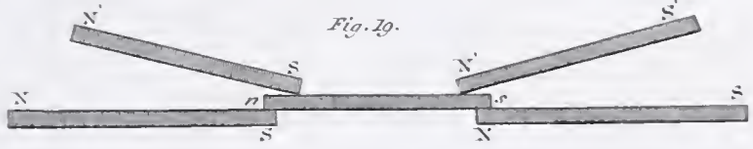

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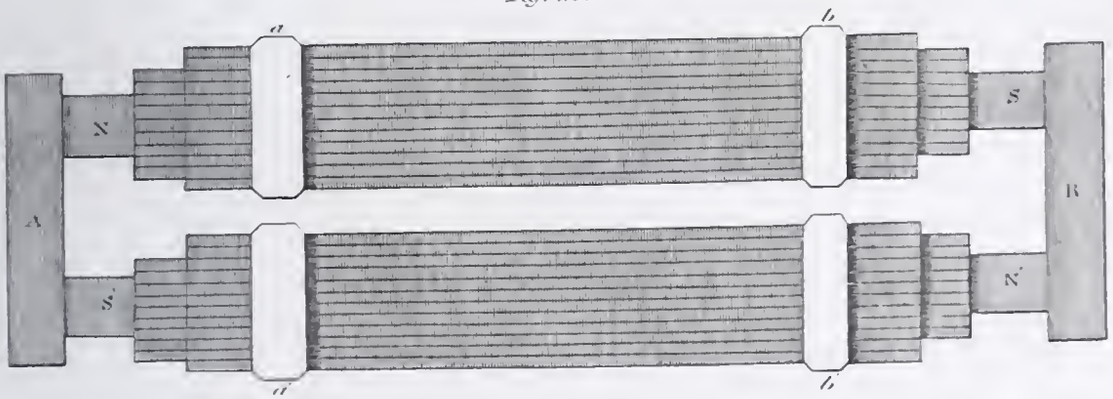

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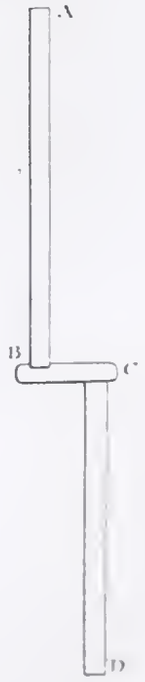

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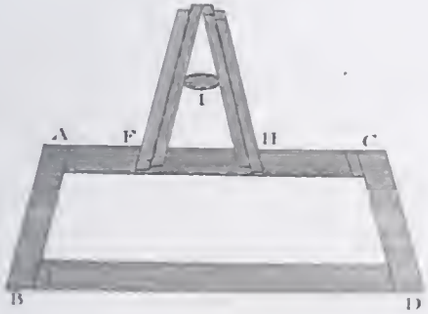

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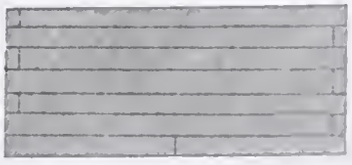

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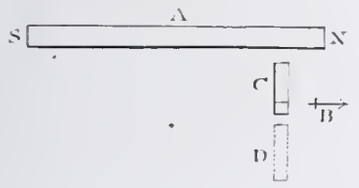

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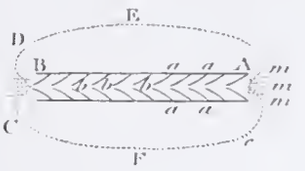

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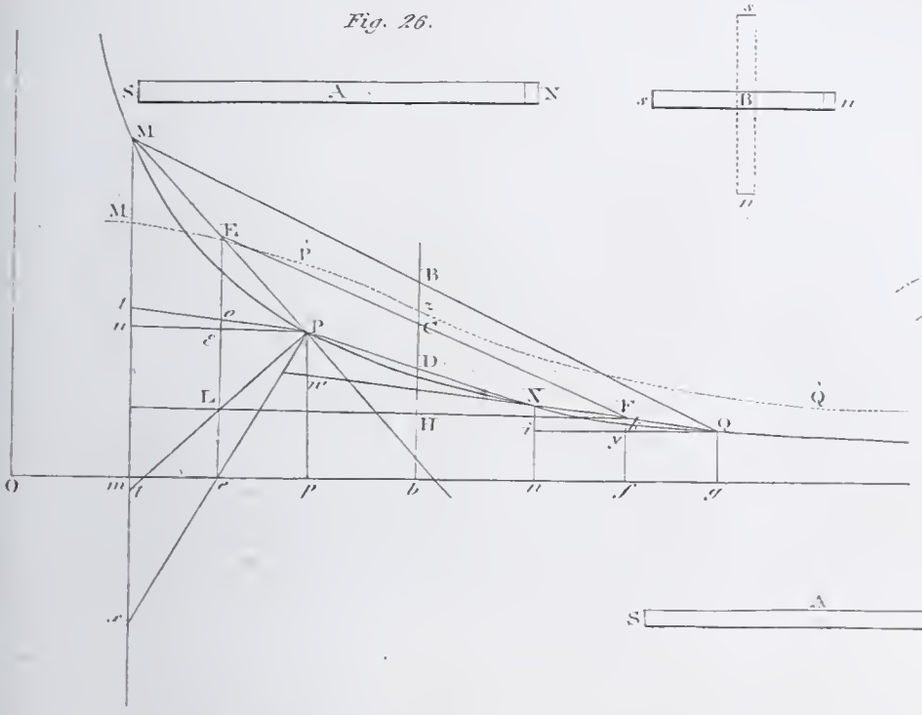

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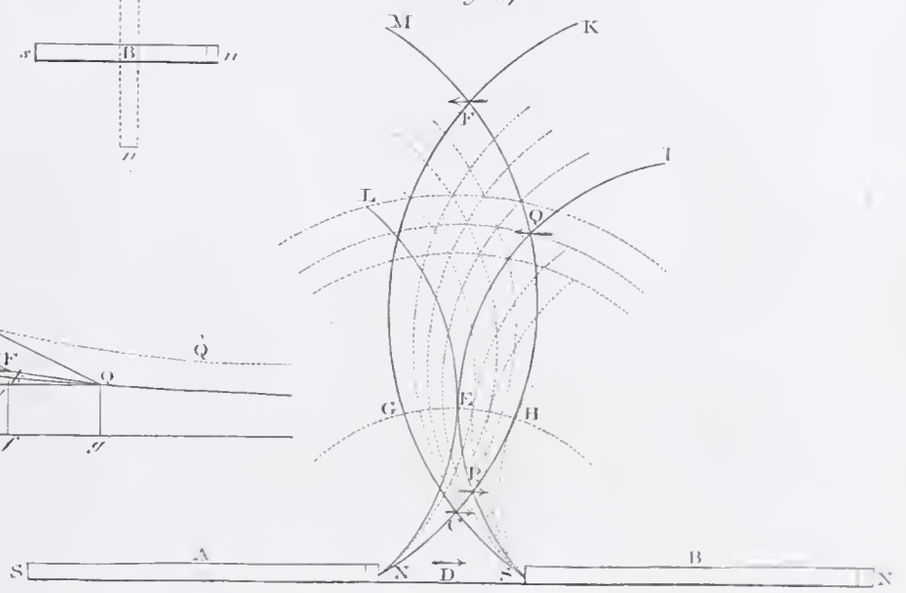

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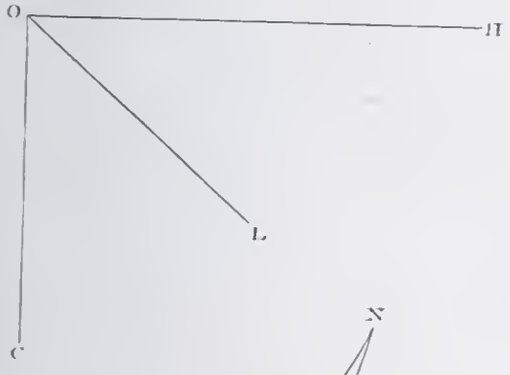

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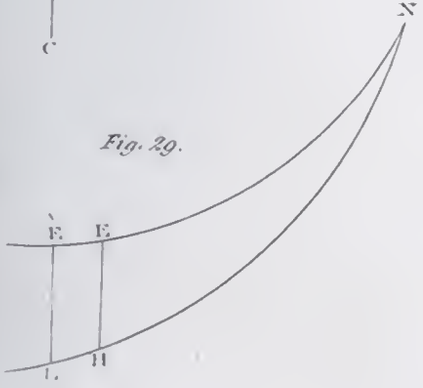

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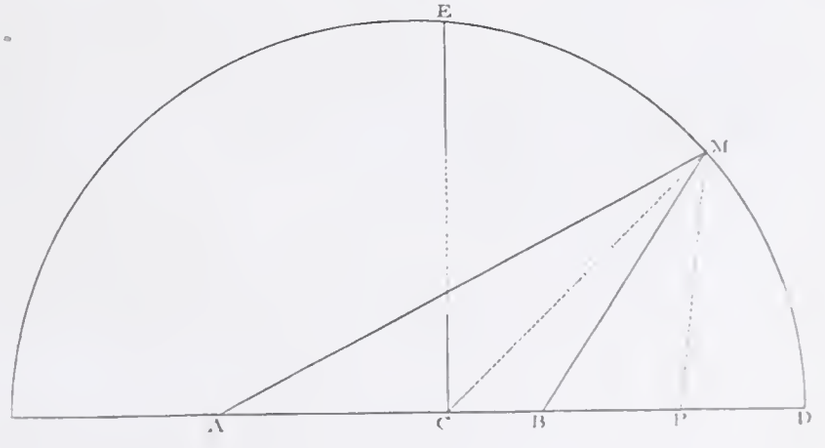

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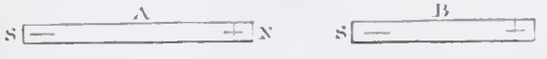

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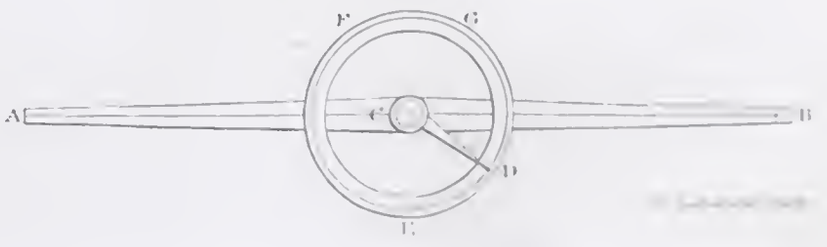

Theory. In another experiment, where two little vessels filled with infusion of litmus were employed, one of them containing two magnetic wires, the south poles of which were immersed in the fluid; the other two similar wires, of which the opposite poles were immersed; the oxidation was greatest in the latter vessel.

The analogy between galvanism and magnetism is still farther proved by other experiments of Ritter on *galvanizing* metals, which he does by placing them in a stream of galvanic fluid proceeding from a strong pile. He found that a golden needle thus galvanized and balanced on a pivot, exhibited, like a magnetized iron needle, both directive power and horizontal inclination.

Some late experiments of Ritter, referring still more directly to the analogy between magnetism and galvanism, were communicated to the Royal Academy of Sciences of Munich, and the following are their general results.

1. Every magnet is equivalent to a pair of heterogeneous metals united together; its different poles represent as it were different metals.

2. Like them, it gives electricity; that is to say, one of the two poles, the positive electricity, and the other the negative.

3. By following the same process a certain number of magnets, as well as a certain number of pairs of metals, afforded electricity; and in this manner the electricities afforded by the poles of different magnets, have been successfully indicated by the electrometer.

4. By means of these electricities, one of these batteries of magnets, accordingly as it is more or less strong, produces upon dead and living bodies, all the phenomena which are produced by a pile of Volta, of the common kind, and of the same force. Theory.

5. The experiments which prove this, show, that in magnetized iron, the south pole gives positive electricity, and the north pole negative electricity; but that on the contrary in magnetized steel, the north pole affords the positive, and the south pole the negative.

6. The same inverse disposition is also observed with regard to the polar oxidability of the magnetized body in which this change is produced by magnetism. In magnetized iron the south pole is most oxidable, and the north pole least; whereas in magnetized steel the north pole is most oxidable, and the south least.

7. Mr Ritter thinks, that by considering the earth as an immense magnet, these results might serve to explain various phenomena of nature, such as the physical difference between the two hemispheres, the aurora borealis and aurora australis. In fact, after what has been just stated, the earth considered as a magnet, may be taken as an equivalent to an immense pile of Volta, of which the poles are on one side sufficiently closed by the waters of the ocean. And the action of this pile must produce, and has produced the greatest chemical changes, in the materials of the earth; changes which must have differed according to the poles; and of which pile the poles at the other extremity have always such an abundance of electricity as to cause its splendour to appear by radiations in the vast spaces of the heavens*.

The foregoing experiments appear to prove that magnetism has some effect in producing chemical changes, and thence we may infer that perhaps it would not be altogether inactive in the animal economy.

* *Nicholson's Journal*, xv. 78.

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MAG

Animal Magnetism.

Animal MAGNETISM, a sympathy supposed by some persons to exist between the magnet and the human body: by means of which the former, it was thought, possessed the property of curing many diseases.

The notion of animal magnetism appears to have originated in 1774, with a German philosopher named *Father Hehl*, who greatly recommended the use of the magnet in medicine. M. Mesmer, a physician of the same country, by adopting the principles of Hehl, became the direct founder of the system; but afterwards deviating from the tenets of his instructor, he lost his patronage, as well as that of Dr Ingenhousz, which he had formerly enjoyed. Mesmer had already distinguished himself by "A dissertation on the influence of the Stars upon the human body," which he publicly defended in a thesis before the university of Vienna; but he

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he was so unable to stand before the opposition of Hehl and Ingenhousz, that his system fell almost instantly into disrepute. Mesmer appealed to the Academy of Sciences at Berlin; but they rejected his principles as destitute of foundation, and unworthy of the smallest attention. He then made a tour through Germany, publishing everywhere the great cures he performed by means of his animal magnetism, while his enemies everywhere pursued him with detections of the falsehood of his assertions.

Mesmer, still undaunted by so many defeats, returned to Vienna; but meeting there with no better success than before, he retired to Paris in the beginning of the year 1778. Here he met with a very different reception. He was first patronized by the author of the *Dictionnaire des Merveilles de la Nature;* in which work a great number of his cures were published, Mesmer himself receiving likewise an ample testimony of his candour and *solid reasoning*. Our physician soon collected some patients; and in the month of April 1778 retired with them to Creteil, from whence he in a short time returned with them perfectly cured. His success was now as great as his former disappointment. Patients increased so rapidly that the doctor was soon obliged to take in pupils to assist him in his operations. These pupils succeeded equally well as Mesmer himself; and so well did they take care of their own emolument, that one of them named M. Deslon realized upwards of 100,000l. sterling. In 1779 Mesmer published a memoir on the subject of Animal Magnetism, promising afterwards a complete work upon the same, which should make as great a revolution in philosophy as it had already done in medicine.

The new system now gained ground daily; and soon became so fashionable, that the jealousy of the faculty was roused, and an application concerning it was made to government. In consequence of this a committee was appointed to inquire into the matter, consisting partly of physicians and partly of members of the Royal Academy of Sciences, with Dr Benjamin Franklin at their head. This was a thunderstroke to the supporters of the new doctrine.——Mesmer himself refused to have any communication with the committee; but his most celebrated pupil Deslon was less scrupulous, and explained the principles of his art in the following manner:

1. Animal magnetism is an universal fluid, constituting an absolute plenum in nature, and the medium of all mutual influence between the celestial bodies, and betwixt the earth and animal bodies.

2. It is the most subtle fluid in nature; capable of a flux and reflux, and of receiving, propagating, and continuing all kinds of motion.

3. The animal body is subjected to the influences of this fluid by means of the nerves, which are immediately affected by it.

4. The human body has poles and other properties analogous to the magnet.

5. The action and virtue of animal magnetism may be communicated from one body to another, whether animate or inanimate.

6. It operates at a great distance without the intervention of any body.

7. It is increased and reflected by mirrors; communicated, propagated, and increased by sound; and may be accumulated, concentrated, and transported.

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8. Notwithstanding the universality of this fluid, all animal bodies are not equally affected by it; on the other hand, there are some, though but few in number, the presence of which destroys all the effects of animal magnetism.

9. By means of this fluid nervous disorders are cured immediately, and others mediately; and its virtues, in short, extend to the universal cure and preservation of mankind.

From this extraordinary theory, Mesmer or M. Deslon, had fabricated a paper, in which he stated that there was in nature but one disease and one cure, and that this cure was animal magnetism: and, lastly, M. Deslon engaged, 1. To prove to the commissioners, that such a thing as animal magnetism existed; 2. To prove the utility of it in the cure of diseases; after which he was to communicate to them all that he knew upon the subject. The commissioners accordingly attended in the room where the patients underwent the magnetical operations. The apparatus consisted of a circular platform made of oak, and raised about a foot and a half from the ground; which platform was called the *baquet*. At the top of it were a number of holes, in which were iron rods with moveable joints for the purpose of applying them to any part of the body. The patients were placed in a circle round, each touching an iron rod, which he could apply to any part of the body at pleasure; they were joined to one another by a cord passing round their bodies, the design being to increase the effect by communication. In the corner of the room was a piano forte, on which some airs were played, occasionally accompanied with a song. Each of the patients held in his hand an iron rod ten or twelve feet long; the intention of which, as Deslon told the commissioners, was to concentrate the magnetism in its point, and thus to render its effects more sensible. Sound is another conductor of this magnetism; and in order to communicate the magnetism to the piano forte, nothing more is necessary than to bring the iron rod near it. Some magnetism is also furnished by the person who plays it; and this magnetism is transmitted to the patients by the sounds. The internal part of the platform was said to be so contrived as to concentrate the magnetism, and was the reservoir whence the virtue diffused itself among the patients. Its structure, however, is not mentioned; but the committee satisfied themselves, by means of a needle and electrometer, that neither common magnetism nor electricity was concerned.

Besides the different ways of receiving the magnetism already mentioned, viz. by the iron, cord, and piano forte, the patients also had it directly from the doctor's finger, and a rod which he held in his hand, and which he carried about the face, head, or such parts of the patient as were diseased; observing always the direction of what he called the poles. The principal application of magnetism, however, was by pressure of the hands or fingers on the hypochondria or lower regions of the stomach.

The effects of these operations upon Deslon's patients were very different. Some felt nothing, neither had the magnetism any effect whatever upon them. Some

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Some spit, coughed, sweat, and felt, or pretended to feel, extraordinary heats in different parts of the body. Many women, but very few men, had convulsions, which Deslon called their crisis, &c.—The commissioners at last found that they could come to no satisfactory conclusion while they attended in this public way, and therefore determined to try the experiments themselves privately. As the fluid itself, however, was totally imperceptible by any of the senses, they could only ascertain themselves of its existence by ultimately curing diseases, or by its observable effects upon the human body. Being well assured, however, that though many diseases were cured, it would not amount to any proof of the existence of animal magnetism, they determined to observe its effects on the animal economy. For this purpose they made the following experiments:

1. They tried it upon themselves, and felt nothing.

2. Seven of Deslon's patients were magnetized at Dr Franklin's house, four of whom felt nothing; three felt, or affected to feel, something.

3. Several persons in a higher sphere of life were magnetized, and felt nothing.

4. The commissioners, now determined to discover what share imagination had in this business, blindfolded several of the common people, and made them sometimes think that they were magnetized, at other times they magnetized them without letting them know that they did so: the consequence was, that when they supposed themselves magnetized, the patients likewise thought they felt something, and *vice versa*.

5. A magnetized tree was said to produce convulsions; a young man, blindfolded, fell into convulsions when he imagined himself near the tree, though he was really at a considerable distance from it. Deslon accounted for this on the principle of all trees being magnetic: but in this case, every one, susceptible of magnetism, would be seized with convulsions when he approached a tree. The same influence of imagination was observed in a woman accustomed to have convulsions when magnetized. They came on when nothing was done to her, on being told, when blinded, that she was magnetized.

Other instances are given, from which it was evident, either that the patients were impostors, or in such a most wretched state of debility both of mind and body, that the most trifling effects of the former had the most powerful effects on the latter. The commissioners therefore entirely disapproved of the whole. The touch, imitation, and imagination, they concluded, were the great causes of the effects produced by M. Deslon's operations; and by means of these they supposed, that convulsions, which in themselves are a very violent disorder, might be spread much farther than could be wished, even through a whole city. It was observed that the operator sometimes pressed strongly, and for a length of time, upon different parts of the body, particularly the hypochondria and pit of the stomach; and it is well known that a strong pressure on these parts will produce disagreeable sensations in those who enjoy perfect health.

It is needless to add more upon this subject, than that Mesmer complained of the report of the commissioners, petitioned parliament, was by them commanded to discover the mysteries of his doctrine; and that it is now exploded by every man of sense.—The conclusion of the academicians concerning it was, that it is not entirely useless even to philosophy; as it is one *fact* more to be consigned to the history of the errors and illusions of the human mind, and a signal instance of the power of imagination.

Animal Magnetism || Mahie.

MAGNIFYING, the making of objects appear larger than they would otherwise do; whence convex lenses, which have the power of doing this, are called *magnifying glasses*. See Optics.

MAGNITUDE, whatever is made up of parts locally extended, or that has several dimensions; as a line, surface, solid, &c.

MAGNOLIA, the Laurel-leaved Tulip Tree, a genus of plants belonging to the polyandria class; and in the natural method ranking under the 52d order, *Coadunatæ*. See Botany *Index*.

MAGNUS campus, in *Ancient Geography*, a tract lying towards Scythopolis, or Bethsan in Galilee, beyond which it extends into Samaria; Josephus placing the common boundary between these two districts in the Campus Magnus. Called also *Esdrelon*, (Judith); 30 miles long, and 18 broad; having Samaria with Mount Ephraim to the south, the lake Genesareth to the east, Mount Carmel to the west, and Lebanon to the north.

Magnus Portus, in *Ancient Geography*, a port of the Belgæ, in Britain, on the Channel. Now thought to be Portsmouth in Hampshire.—Another *Portus Magnus* of Bætica in Spain; a port to the east of Abdera.

MAGO, the name of several Carthaginian generals. See Carthage.

Mago, in *Ancient Geography*, a citadel and town of the Balearis Minor, or Minorca. Now Maon, or Mahon. E. Long. 4. 6. N. Lat. 39. 5.

MAGONTIACUM, Mogontiacum, or *Mogontiacus*, truncated afterwards by the poets to Mogontia, Maguntia, and Moguntia: a town of Gallia Belgica. Now *Mentz*, capital of the electorate of that name; situated at the confluence of the Rhine and Maine. E. Long. 8°. N. Lat. 50°.

MAGOPHONIA (formed from μαγος, "magus," and φονος, "slaughter"), the name of a feast among the ancient Persians, held in memory of the expulsion of the Magians. The Magian Smerdis having usurped the throne of Persia, upon the death of Cambyses, 521 years before Jesus Christ, seven of the principal lords of the court conspired to drive him out of it.—Their design was executed with good success. Smerdis and his brother, another Magian, called Patizithes, were killed. Upon which the people also arose, and put all the Magi to the sword, insomuch that there would not one have escaped, had not night come upon them. Darius, son of Hystaspes, was then elected king; and, in memory of this massacre of the Magi, a feast was instituted, says Herodotus, called *Magophonia*. See Magi.

MAGPIE. See Corvus, Ornithology *Index*.

MAHIE, the name given by the inhabitants of Otaheite, or George's island, to their bread-fruit when made into a kind of sour paste, which, in consequence of having undergone a fermentation, will keep a considerable

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siderable time, and supply them with food when no ripe fruit is to be had. When therefore they see a great show of new fruit on the trees, they strip them all at once of their former crop, of which they make mahie. This *succedaneum* for ripe bread-fruit is thus made. They gather the fruit before it be perfectly ripe, and laying it in heaps, cover it closely with leaves. In this state it ferments, and becomes disagreeably sweet; the core is then taken out entire, and the rest of the fruit thrown into a hole in their houses, dug on purpose, and neatly lined in the bottom and sides with grass. The whole is then covered with leaves, and heavy stones are laid upon it. In this state it undergoes a second fermentation, and becomes sour; after which it will suffer no change for many months. It is taken out of this hole as it is wanted for use, and being made into balls, it is wrapped up in leaves and baked, and thus dressed it will keep for five or six weeks. It is eaten, both cold and hot, and the natives of those countries seldom make a meal without it; but to Captain Cook and his company the taste was as disagreeable as that of a pickled olive generally is the first time it is eaten.

MAHO. See HIBISCUS, BOTANY *Index*.

MAHOGANY. See SWIETENIA, BOTANY *Index*.

MAHOMET, or MOHAMMED, styled the *Impostor*, was born in the reign of Anushirwan the Just, emperor of Persia, about the end of the 6th century of the Christian era. He came into the world under some disadvantages. His father Abd'allah was a younger son of Abd'almotalleb; and dying very young, and in his father's lifetime, left his widow and infant son in very mean circumstances, his whole substance consisting but of five camels and one Ethiopian she-slave. Abd'almotalleb was, therefore, obliged to take care of his grandchild Mahomet; which he not only did during his life, but at his death enjoined his eldest son Abu-Taleb, who was brother to Abd'allah by the same mother to provide for him for the future; which he very affectionately did, and instructed him in the business of a merchant, which he followed; and to that end he took him into Syria when he was but 13. He afterwards recommended him to Khadijah, a noble and rich widow, for her factor; in whose service he behaved himself so well, that by making him her husband she soon raised him to an equality with the richest in Mecca.

After he began by this advantageous match to live at his ease, it was, that he formed the scheme of establishing a new religion, or, as he expressed it, of replanting the only true and ancient one professed by Adam, Noah, Abraham, Moses, Jesus, and all the prophets, by destroying the gross idolatry into which the generality of his countrymen had fallen, and weeding out the corruptions and superstitions which the latter Jews and Christians had, as he thought, introduced into their religion, and reducing it to its original purity, which consisted chiefly in the worship of one only God.

Before he made any attempt abroad, he rightly judged that it was necessary for him to begin with the conversion of his own household. Having therefore retired with his family, as he had done several times before, to a cave in Mount Hara, he there opened the secret of his mission to his wife Khadijah; and acquainted her, that the angel Gabriel had just before appeared to him, and told him that he was appointed the apostle of God: he also repeated to her a passage which he pretended had been revealed to him by the ministry of the angel, with those other circumstances of this first appearance, which are related by the Mahometan writers. Khadijah received the news with great joy; swearing by him in whose hands her soul was, that she trusted he would be the prophet of his nation; and immediately communicated what she had heard to her cousin Warakah Ebn Nawfal, who, being a Christian, could write in the Hebrew character, and was tolerably well versed in the scriptures; and he as readily came into her opinion, assuring her that the same angel who had formerly appeared unto Moses was now sent to Mahomet. The first overture the prophet made was in the month of Ramadan, in the 40th year of his age, which is therefore usually called the year of his mission. Mahomet.

Encouraged by so good a beginning, he resolved to proceed, and try for some time what he could do by private persuasion, not daring to hazard the whole affair by exposing it too suddenly to the public. He soon made proselytes of those under his own roof, viz. his wife Khadijah, his servant Zeid Ebn Haretha, to whom he gave his freedom on that occasion, (which afterwards became a rule to his followers), and his cousin and pupil Ali, the son of Abu Taleb, though then very young: but this last, making no account of the other two, used to style himself the *first of believers*. The next person Mahomet applied to was Abd'allah Ebn Abi Kohafa, surnamed *Abu Becr*, a man of great authority among the Koreish, and one whose interest he well knew would be of great service to him; as it soon appeared: for Abu Becr, being gained over, prevailed also on Othman Ebn Affan, Abd'alraham Ebn Awf, Saad Ebn Abbi Wakkas, Al Zobeir Ebn al Awam, and Telha Ebn Obeid'allah, all principal men of Mecca, to follow his example. These men were the six chief companions, who, with a few more, were converted in the space of three years; at the end of which, Mahomet having, as he hoped, a sufficient interest to support him, made his mission no longer a secret, but gave out that God had commanded him to admonish his near relations; and in order to do it with more convenience and prospect of success, he directed Ali to prepare an entertainment, and invite the sons and descendants of Abd'almotalleb, intending then to open his mind to them. This was done, and about 40 of them came; but Abu Laheb, one of his uncles, making the company break up before Mahomet had an opportunity of speaking, obliged him to give them a second invitation the next day; and when they were come he made them the following speech: 'I know no man in all Arabia who can offer his kindred a more excellent thing than I now do you; I offer you happiness both in this life, and in that which is to come; God Almighty hath commanded me to call you unto him: Who, therefore, among you will be assistant to me herein, and become my brother and my vicegerent?' All of them hesitating, and declining the matter, Ali at length rose up, and declared that he would be his assistant; and vehemently threatened those who should oppose him. Mahomet upon this embraced Ali with great demonstrations of affection, and desired all who

Mahomet. were present to hearken to and obey him as his deputy; at which the company broke out into a great laughter, telling Abu Taleb that he must now pay obedience to his son.

This repulse, however, was so far from discouraging Mahomet, that he began to preach in public to the people; who heard him with some patience, till he came to upbraid them with the idolatry, obstinacy, and perverseness of themselves and their fathers: which so highly provoked them, that they declared themselves his enemies; and would soon have procured his ruin, had he not been protected by Abu Taleb. The chief of the Koreish warmly solicited this person to desert his nephew, making frequent remonstrances against the innovations he was attempting; which proving ineffectual, they at length threatened him with an open rupture, if he did not prevail on Mahomet to desist. At this Abu Taleb was so far moved, that he earnestly dissuaded his nephew from pursuing the affair any farther, representing the great danger he and his friends must otherwise run. But Mahomet was not to be intimidated; telling his uncle plainly, *that if they set the sun against him on his right hand, and the moon on his left, he would not leave his enterprise:* And Abu Taleb, seeing him so firmly resolved to proceed, used no further arguments, but promised to stand by him against all his enemies.

The Koreish, finding they could prevail neither by fair words or menaces, tried what they could do by force and ill treatment; using Mahomet's followers so very injuriously, that it was not safe for them to continue at Mecca any longer: whereupon Mahomet gave leave to such of them as had not friends to protect them to seek for refuge elsewhere. And accordingly in the fifth year of the prophet's mission, 16 of them, four of whom were women, fled into Ethiopia; and among them Othman Ebn Affan and his wife Rakiah, Mahomet's daughter. This was the first flight; but afterwards several others followed them, retiring one after another, to the number of 83 men and 18 women, besides children. These refugees were kindly received by the Najashi, or king of Ethiopia; who refused to deliver them up to those whom the Koreish sent to demand them, and, as the Arab writers unanimously attest, even professed the Mahometan religion.

In the sixth year of his mission, Mahomet had the pleasure of seeing his party strengthened by the conversion of his uncle Hamza, a man of great valour and merit; and of Omar Ebn al Kattab, a person highly esteemed, and once a violent opposer of the prophet. As persecution generally advances rather than obstructs the spreading of a religion, Islamism made so great a progress among the Arab tribes, that the Koreish, to suppress it effectually if possible, in the seventh year of Mahomet's mission, made a solemn league or covenant against the Hashemites and the family of Abd'almotalleb, engaging themselves to contract no marriages with any of them, and to have no communication with them; and, to give it the greater sanction, reduced it into writing, and laid it up in the Caaba. Upon this the tribe became divided into two factions; and the family of Hashem all repaired to Abu Taleb, as their head: except only Abd'al Uzza, surnamed *Abu Lahab*, who, out of inveterate hatred to his nephew and his doctrine, went over to the opposite party, whose Mahomet. chief was Abu Sosian Ebn Harb, of the family of Ommeya.

The families continued thus at variance for three years; but in the tenth year of his mission, Mahomet told his uncle Abu Taleb, that God had manifestly showed his disapprobation of the league which the Koreish had made against them, by sending a worm to eat out every word of the instrument except the name of *God*. Of this accident Mahomet had probably some private notice: for Abu Taleb went immediately to the Koreish, and acquainted them with it; offering, if it proved false, to deliver his nephew up to them; but in case it were true, he insisted that they ought to lay aside their animosity, and annul the league they had made against the Hashemites. To this they acquiesced; and going to inspect the writing, to their great astonishment found it to be as Abu Taleb had said; and the league was thereupon declared void.

In the same year Abu Taleb died, at the age of above fourscore, and it is the general opinion that he died an infidel: though others say, that when he was at the point of death he embraced Mahometism; and produce some passages out of his poetical compositions to confirm their assertion. About a month, or, as some write, three days after the death of this great benefactor and patron, Mahomet had the additional mortification to lose his wife Khadijah, who had so generously made his fortune. For which reason this year is called the *year of mourning*.

On the death of these two persons, the Koreish began to be more troublesome than ever to their prophet, and especially some who had formerly been his intimate friends; insomuch that he found himself obliged to seek for shelter elsewhere, and first pitched upon Tayef, about 60 miles east from Mecca, for the place of his retreat. Thither therefore he went, accompanied by his servant Zeid, and applied himself to two of the chief of the tribe of Thakif who were the inhabitants of that place; but they received him very coldly. However, he staid there a month; and some of the more considerate and better sort of men treated him with a little respect: but the slaves and inferior people at length rose against him; and bringing him to the wall of the city, obliged him to depart and return to Mecca, where he put himself under the protection of Al Motaam Ebn Adi.

This repulse greatly discouraged his followers. However, Mahomet was not wanting to himself; but boldly continued to preach to the public assemblies at the pilgrimage, and gained several proselytes; and among them six of the inhabitants of Yathreb of the Jewish tribe of Khazraj; who, on their return home, failed not to speak much in commendation of their new religion, and exhorted their fellow citizens to embrace the same.

In the 12th year of his mission it was that Mahomet gave out that he had made his night-journey from Mecca to Jerusalem, and thence to heaven, so much spoken of by all that write of him. Dr Prideaux thinks he invented it, either to answer the expectations of those who demanded some miracle as a proof of his mission; or else, by pretending to have conversed with God, to establish the authority of whatever he should think fit to leave behind by way of oral tradition, and

make

Mahomet. make his sayings to serve the same purpose as the oral law of the Jews. But it does not appear that Mahomet himself ever expected so great a regard should be paid to his sayings, as his followers have since done; and seeing he all along disclaimed any power of performing miracles, it seems rather to have been a fetch of policy to raise his reputation, by pretending to have actually conversed with God in heaven, as Moses had heretofore done in the Mount, and to have received several institutions immediately from him, whereas before he contented himself with persuading them that he had all by the ministry of Gabriel.

However, this story seemed so absurd and incredible, that several of his followers left him upon it; and had probably ruined the whole design, had not Abu Beer vouched for his veracity, and declared, that if Mahomet affirmed it to be true, he verily believed the whole. Which happy incident not only retrieved the prophet's credit, but increased it to such a degree, that he was secure of being able to make his disciples swallow whatever he pleased to impose on them for the future. And this fiction, notwithstanding its extravagance, was one of the most artful contrivances Mahomet ever put in practice, and what chiefly contributed to the raising of his reputation to that great height to which it afterwards arrived.

In this year, called by the Mahometans the *accepted year*, 12 men of Yathreb or Medina, of whom 10 were of the tribe of Khazraj, and the other two of that of Aws, came to Mecca, and took an oath of fidelity to Mahomet at Al Akaba, a hill on the north of that city. This oath was called the *women's oath*; not that any women were present at this time, but because a man was not thereby obliged to take up arms in defence of Mahomet or his religion; it being the same oath that was afterwards exacted of the women, the form of which we have in the Koran, and is to this effect: viz. That they should renounce all idolatry; that they should not steal nor commit fornication, nor kill their children (as the Pagan Arabs used to do when they apprehended they should not be able to maintain them), nor forge calumnies; and that they should obey the prophet in all things that were reasonable. When they had solemnly engaged to all this, Mahomet sent one of his disciples, named *Masab Ebn Omair*, home with them, to instruct them more fully in the grounds and ceremonies of his new religion.

Masab being arrived at Medina, by the assistance of those who had been formerly converted, gained several proselytes, particularly Osaid Ebn Hodeira, a chief man of the city, and Saad Ebn Moadh, prince of the tribe of Aws; Mahometanism spreading so fast, that there was scarce a house wherein there were not some who had embraced it.

The next year being the 13th of Mahomet's mission, Masab returned to Mecca, accompanied by 73 men and two women of Medina who had professed Islamism, besides some others who were as yet unbelievers. On their arrival they immediately sent to Mahomet, and offered him their assistance, of which he was now in great need; for his adversaries were by this time grown so powerful in Mecca, that he could not stay there much longer without imminent danger. Wherefore he accepted their proposal, and met them one night, by appointment, at Al Akaba above mentioned, attended by his uncle Al Abbas; who, though he was Mahomet. not then a believer, wished his nephew well, and made a speech to those of Medina, wherein he told them that as Mahomet was obliged to quit his native city, and seek an asylum elsewhere, and they had offered him their protection, they would do well not to deceive him; that if they were not firmly resolved to defend, and not betray him, they had better declare their minds, and let him provide for his safety in some other manner. Upon their protesting their sincerity, Mahomet swore to be faithful to them, on condition that they should protect him against all insults as heartily as they would their own wives and families. They then asked him what recompense they were to expect if they should happen to be killed in his quarrel; he answered, Paradise. Whereupon they pledged their faith to him, and so returned home; after Mahomet had chosen 12 out of their number, who were to have the same authority among them as the 12 apostles of Christ had among his disciples.

Hitherto Mahomet had propagated his religion by fair means; so that the whole success of his enterprise, before his flight to Medina, must be attributed to persuasion only, and not to compulsion. For before this second oath of fealty or inauguration at Al Akaba, he had no permission to use any force at all; and in several places of the Koran, which he pretended were revealed during his stay at Mecca, he declares his business was only to preach and admonish; that he had no authority to compel any person to embrace his religion; and that, whether people believe or not, was none of his concern, but belonged solely unto God. And he was so far from allowing his followers to use force, that he exhorted them to bear patiently those injuries which were offered them on account of their faith; and, when persecuted himself, chose rather to quit the place of his birth and retire to Medina, than to make any resistance. But this great passiveness and moderation seem entirely owing to his want of power, and the great superiority of his opposers for the first 12 years of his mission; for no sooner was he enabled, by the assistance of those of Medina, to make head against his enemies, that he gave out, that God had allowed him and his followers to defend themselves against the infidels; and at length, as his forces increased, he pretended to have the divine leave even to attack them, and to destroy idolatry, and set up the true faith by the sword: finding, by experience, that his designs would otherwise proceed very slowly, if they were not utterly overthrown; and, knowing, on the other hand, that innovators, when they depend solely on their own strength, and can compel, seldom run any risk; from whence, says Machiavel, it follows, that all the armed prophets have succeeded, and the unarmed ones have failed. Moses, Cyrus, Theseus, and Romulus, would not have been able to establish the observance of their institutions for any length of time, had they not been armed. The first passage of the Koran, which gave Mahomet the permission of defending himself by arms, is said to have been that in the 22d chapter; after which a great number to the same purpose were revealed.

That Mahomet had a right to take up arms for his own defence against his unjust persecutors, may perhaps be allowed; but whether he ought afterwards to

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have made use of that means for the establishing of his religion, it is not so easy to determine. How far the secular power may or ought to interpose in affairs of this nature, mankind are not agreed. The method of converting by the sword gives no very favourable idea of the faith which is so propagated, and is disallowed by every body in those of another religion, though the same persons are willing to admit of it for the advancement of their own: supposing that, though a false religion ought not to be established by authority, yet a true one may: and accordingly force is almost as constantly employed in these cases by those who have the power in their hands, as it is constantly complained of by those who suffer the violence. It is certainly one of the most convincing proofs that Mahometanism was no other than a human invention, that it owed its progress and establishment almost entirely to the sword; and it is one of the strongest demonstrations of the divine original of Christianity, that it prevailed against all the force and powers of the world by the mere dint of its own truth, after having stood the assaults of all manner of persecutions, as well as other oppositions, for 300 years together, and at length made the Roman emperors themselves submit thereto; after which time, indeed, this proof seems to fail, Christianity being then established, and Paganism abolished, by public authority, which has had great influence in the propagation of the one and destruction of the other ever since. But to return.

Mahomet having provided for the security of his companions as well as his own, by the league offensive and defensive which he had now concluded with those of Medina, directed them to repair thither, which they accordingly did; but himself with Abu Becr and Ali staid behind, having not yet received the divine permission, as he pretended, to leave Mecca. The Koreish fearing the consequence of this new alliance, began to think it absolutely necessary to prevent Mahomet's escape to Medina; and having held a council thereon, after several milder expedients had been rejected, they came to a resolution that he should be killed; and agreed that a man should be chosen out of every tribe for the execution of this design; and that each man should have a blow at him with his sword, that the guilt of his blood might fall equally on all the tribes, to whose united power the Hashemites were much inferior, and therefore durst not attempt to revenge their kinsman's death.

This conspiracy was scarce formed, when, by some means or other, it came to Mahomet's knowledge; and he gave out that it was revealed to him by the angel Gabriel, who had now ordered him to retire to Medina. Whereupon, to amuse his enemies, he directed Ali to lie down in his place, and wrap himself up in his green cloak, which he did; and Mahomet escaped miraculously, as they pretend, to Abu Becr's house, unperceived by the conspirators, who had already assembled at the prophet's door. They, in the mean time, looking through the crevice, and seeing Ali, whom they took to be Mahomet himself, asleep, continued watching there till morning, when Ali arose, and they found themselves deceived.

From Abu Becr's house Mahomet and he went to a cave in Mount Thur, to the south-east of Mecca, accompanied only by Amer Ebn Foheirah, Abu Becr's servant, and Abd'allah Ebn Oreitah, an idolater whom they had hired for a guide. In this cave they lay hid three days, to avoid the search of their enemies; which they very narrowly escaped, and not without the assistance of more miracles than one: for some say that the Koreish were struck with blindness, so that they could not find the cave; others, that after Mahomet and his companions were got in, two pigeons laid their eggs at the entrance, and a spider covered the mouth of the cave with her web, which made them look no farther. Abu Becr, seeing the prophet in such imminent danger, became very sorrowful; whereupon Mahomet comforted him with these words recorded in the Koran, *Be not grieved, for God is with us.* Their enemies being retired, they left the cave, and set out for Medina, by a by-road; and having fortunately, or, as the Mahometans tell us, miraculously, escaped some who were sent to pursue them, arrived safely at that city; whither Ali followed them in three days, after he had settled some affairs at Mecca.

Mahomet

The first thing Mahomet did after his arrival at Medina, was to build a temple for his religious worship, and a house for himself, which he did on a parcel of ground which had before served to put camels in, or, as others tell us, for a burying-ground, and belonged to Sahal and Soheil the sons of Amru, who were orphans. This action Dr Prideaux exclaims against, representing it as a flagrant instance of injustice; for that, says he, he violently dispossessed these poor orphans, the sons of an inferior artificer, (whom the author he quotes calls a *carpenter*), of this ground, and so founded the first fabric of his worship with the like wickedness as he did his religion. But, to say nothing of the improbability that Mahomet should act in so impolitic a manner at his first coming, the Mahometan writers set this affair in a quite different light: one tells us that he treated with the lads about the price of the ground, but they desired he would accept it as a present: however, as historians of good credit assure us, he actually bought it; and the money was paid by Abu Becr. Besides, had Mahomet accepted it as a present, the orphans were in circumstances sufficient to have afforded it: for they were of a very good family, of the tribe of Najjer, one of the most illustrious among the Arabs; and not the sons of a carpenter, as Dr Prideaux's author writes, who took the word *Najjer*, which signifies "a carpenter," for an appellative, whereas it is a proper name.

Mahomet, being securely settled at Medina, and able not only to defend himself against the insults of his enemies, but to attack them, began to send out small parties to make reprisals on the Koreish; the first party consisting of no more than nine men, who intercepted and plundered a caravan belonging to that tribe, and in the action took two prisoners. But what established his affairs very much, and was the foundation on which he built all his succeeding greatness, was the gaining of the battle of Bedr, which was fought in the second year of the Hegira, and is so famous in the Mahometan history. Some reckon no less than 27 expeditions wherein Mahomet was personally present, in nine of which he gave battle, besides several other expeditions in which he was not present.

His

Mahomet. His forces he maintained partly by the contributions of his followers for this purpose, which he called by the name of *zacat* or *alms*, and the paying of which he very artfully made one main article of his religion; and partly by ordering a fifth part of the plunder to be brought into the public treasury for that purpose, in which matter he likewise pretended to act by the divine direction.

In a few years, by the success of his arms (notwithstanding he sometimes came off by the worst) he considerably raised his credit and power. In the sixth year of the Hegira he set out with 1400 men to visit the temple of Mecca, not with any intent of committing hostilities, but in a peaceable manner. However, when he came to Al Hodeibiya, which is situated partly within and partly without the sacred territory, the Koreish sent to let him know that they would not permit him to enter Mecca, unless he forced his way; whereupon he called his troops about him, and they all took a solemn oath of fealty or homage to him, and he resolved to attack the city; but those of Mecca sending Arwa Ebn Masun, prince of the tribe of Thakif, as their ambassador to desire peace, a truce was concluded between them for ten years, by which any person was allowed to enter into league either with Mahomet, or with the Koreish, as he thought fit.

It may not be improper, in order to show the inconceivable veneration and respect the Mahometans by this time had for their prophet, to mention the account which the above-mentioned ambassador gave the Koreish, at his return, of their behaviour. He said he had been at the courts both of the Roman emperor and of the king of Persia, and never saw any prince so highly respected by his subjects as Mahomet was by his companions; for, whenever he made the ablution, in order to say his prayers, they ran and catched the water that he had used; and, whenever he spit, they immediately licked it up, and gathered every hair that fell from him with great superstition.

In the seventh year of the Hegira, Mahomet began to think of propagating his religion beyond the bounds of Arabia; and sent messengers to the neighbouring princes, with letters to invite them to Mahometanism. Nor was this project without some success. Khosru Parviz, then king of Persia, received his letter with great disdain, and tore it in a passion, sending away the messenger very abruptly; which when Mahomet heard, he said *God shall tear his kingdom*. And soon after a messenger came to Mahomet from Badhan king of Yaman, who was a dependent on the Persians, to acquaint him that he had received orders to send him to Khosru. Mahomet put off his answer till the next morning, and then told the messenger it had been revealed to him that night that Khosru was slain by his son Shiruyeh: adding that he was well assured his new religion and empire should rise to as great a height as that of Khosru; and therefore bid him advise his master to embrace Mahometanism. The messenger being returned, Badhan in a few days received a letter from Shiruyeh, informing him of his father's death, and ordering him to give the prophet no further disturbance. Whereupon Badhan and the Persians with him turned Mahometans.

The emperor Heraclius, as the Arabian historians assure us, received Mahomet's letter with great respect, Mahomet. laying it on his pillow, and dismissed the bearer honourably. And some pretend that he would have professed this new faith, had he not been afraid of losing his crown.

Mahomet wrote to the same effect to the king of Ethiopia, though he had been converted before, according to the Arab writers; and to Mokawkas, governor of Egypt, who gave the messenger a very favourable reception, and sent several valuable presents to Mahomet, and among the rest two girls, one of which, named Mary, became a great favourite with him. He also sent letters of the like purport to several Arab princes; particularly one to Al Haretb Ebu Abi Shamar king of Ghassan, who returning for answer that he would go to Mahomet himself, the prophet said, *May his kingdom perish;* another to Hawdha Ebn Ali, king of Yamama, who was a Christian, and, having some time before professed Islamism, had lately returned to his former faith; this prince sent back a very rough answer, upon which Mahomet cursing him, he died soon after: and a third to Al Monder Ebn Sawa, king of Bahrein, who embraced Mahometanism, and all the Arabs of that country followed his example.

The eighth year of the Hegira was a very fortunate year to Mahomet. In the beginning of it, Khaled Ebn al Walid and Amru Ebn al As, both excellent soldiers, the first of whom afterwards conquered Syria and other countries, and the latter Egypt, became proselytes to Mahometanism. And soon after the prophet sent 3000 men against the Grecian forces, to revenge the death of one of his ambassadors, who, being sent to the governor of Bosra on the same errand as those who went to the above-mentioned princes, was slain by an Arab, of the tribe of Ghassan, at Muta, a town in the territory of Balka in Syria, about three days journey eastward from Jerusalem, near which town they encountered. The Grecians, being vastly superior in number (for, including the auxiliary Arabs, they had an army of 100,000 men), the Mahometans were repulsed in the first attack, and lost successively three of their generals, viz. Zeid Ebn Haretha Mahomet's freedman, Jaafar the son of Abu Taleb, and Abdallah Ebn Rawaha: but Khaled Ebn al Walid succeeding to the command, overthrew the Greeks with a great slaughter, and brought away abundance of rich spoil; on occasion of which action Mahomet gave him the title of *Seif min soyuf Allah*, "one of the swords of God."

In this year also Mahomet took the city of Mecca, the inhabitants whereof had broken the truce concluded on two years before. For the tribe of Beer who were confederates with the Koreish, attacking those of Khozaah, who were allies of Mahomet, killed several of them, being supported in the action by a party of the Koreish themselves. The consequence of this violation was soon apprehended; and Abu Sosian himself made a journey to Medina on purpose to heal the breach and renew the truce: but in vain; for Mahomet, glad of this opportunity, refused to see him: whereupon he applied to Abu Beer and Ali; but they giving him no answer, he was obliged to return to Mecca as he came.

Mahomet immediately gave orders for preparations

Mahomet. to be made, that he might surprise the Meccans while they were unprovided to receive him: in a little time he began his march thither; and by that time he came near the city, his forces were increased to 10,000 men. Those of Mecca, being not in a condition to defend themselves against so formidable an army, surrendered at discretion; and Abu Sosian saved his life by turning Mahometan. About 28 of the idolaters were killed by a party under the command of Khaled; but this happened contrary to Mahomet's orders, who, when he entered the town, pardoned all the Koreish on their submission, except only six men and four women, who were more obnoxious than ordinary (some of them having apostatized), and were solemnly proscribed by the prophet himself; but of these no more than three men and one woman were put to death, the rest obtaining pardon on their embracing Mahometanism, and one of the women making her escape.

The remainder of this year Mahomet employed in destroying the idols in and round Mecca, sending several of his generals on expeditions for that purpose, and to invite the Arabs to Islamism: wherein it is no wonder if they now met with success.

The next year, being the ninth of the Hegira, the Mahometans call *the year of embassies*: for the Arabs had been hitherto expecting the issue of the war between Mahomet and the Koreish: but, so soon as that tribe, the principal of the whole nation, and the genuine descendants of Ishmael, whose prerogatives none offered to dispute, had submitted, they were satisfied that it was not in their power to oppose Mahomet; and therefore began to come in to him in great numbers, and to send embassies to make their submissions to him, both to Mecca, while he staid there, and also to Medina, whither he returned this year. Among the rest, five kings of the tribe of Hamyar professed Mahometanism, and sent ambassadors to notify the same.

In the 10th year, Ali was sent into Yaman to propagate the Mahometan faith there; and, as it is said, converted the whole tribe of Hamdan in one day. Their example was quickly followed by all the inhabitants of that province, except only those of Najran, who, being Christians, chose rather to pay tribute.

Thus was Mahometanism established, and idolatry rooted out, even in Mahomet's lifetime (for he died the next year), throughout all Arabia, except only Yamama, where Moseilama, who set up also for a prophet as Mahomet's competitor, had a great party, and was not reduced till the caliphate of Abu Beer: and the Arabs being then united in one faith, and under one prince, found themselves in a condition of making those conquests which extended the Mahometan faith over so great a part of the world.

MAHOMET, the name of several emperors of the Turks; of whom the most celebrated is,

MAHOMET II. surnamed *the Great*, their seventh sultan. See TURKEY.

He was born at Adrianople the 24th of March 1430; and is to be remembered chiefly by us for taking Constantinople in 1453, and thereby driving many learned Greeks into the west, which was a great cause of the restoration of learning in Europe, as the Greek literature was then introduced here. He was one of the greatest men upon record, with regard to the qualities necessary to a conqueror; for he conquered two empires, twelve kingdoms, and two hundred considerable cities. He was very ambitious of the title of Great, and the Turks gave it him; even the Christians have not disputed it with him; for he was the first of the Ottoman emperors whom the Western nations dignified with the title of Grand Seignior or Great Turk, which posterity has preserved to his descendants. Italy had suffered greater calamities, but she had never felt a terror equal to that which this sultan's victories imprinted. The inhabitants seemed already condemned to wear the turban: it is certain, that Pope Sixtus IV. represented to himself Rome as already involved in the dreadful fate of Constantinople; and thought of nothing but escaping into Provence, and once more transferring the holy see to Avignon. Accordingly, the news of Mahomet's death, which happened the 3d of May 1481, was received at Rome with the greatest joy that ever was beheld there. Sixtus caused all the churches to be thrown open, made the trades people leave off their work, ordered a feast of three days, with public prayers and processions, commanded a discharge of the whole artillery of the castle of St Angelo all that time, and put a stop to his journey to Avignon. Mahomet, Mahometanism.

He appears to be the first sultan who was a lover of arts and sciences; and even cultivated polite letters. He often read the History of Augustus, and the other Cæsars; and he perused those of Alexander, Constantine, and Theodosius, with more than ordinary pleasure, because these had reigned in the same country with himself. He was fond of painting, music and sculpture; and he applied himself to the study of agriculture. He was much addicted to astrology; and used to encourage his troops by giving out, that the motion and influence of the heavenly bodies promised him the empire of the world. Contrary to the genius of his country, he delighted so much in the knowledge of foreign languages, that he not only spoke the Arabian, to which the Turkish laws, and the religion of their legislator Mahomet, are appropriated, but also the Persian, the Greek, and the French, that is, the corrupted Italian. Landin, a knight of Rhodes, collected several letters which this sultan wrote in the Syriac, Greek, and Turkish languages, and translated them into Latin. Where the originals are, nobody knows; but the translation has been published several times; as at Lyons 1520, in 4to; at Basil 1554, 12mo; in a collection published by Oporinus, at Marpurg 1604, in 8vo; and at Leipsic 1690, in 12mo. Melchior Junius, professor of eloquence at Strasburg, published at Montbeliard, 1595, a collection of letters, in which there are three written by Mahomet II. to Scanderberg. One cannot discover the least air of Turkish ferocity in these letters: they are written in as civil terms, and as obliging a manner, as the most polite prince in Christendom could have written.

MAHOMETANISM, or MAHOMETISM, the system of religion broached by Mahomet, and still adhered to by his followers. See MAHOMET, and ALCORAN.

Mahometanism.

Mahometanism is professed by the Turks, Persians, and several nations among the Africans, and many among the East Indians.

The Mahometans divide their religion into two general parts, faith and practice: of which the first is divided into six distinct branches: Belief in God, in his angels, in his scriptures, in his prophets, in the resurrection and final judgment, and in God's absolute decrees. The points relating to practice are, prayer, with washings, &c. alms, fasting, pilgrimage to Mecca, and circumcision.

I. Of the Mahometan *Faith*.] 1. That both Mahomet, and those among his followers who are reckoned orthodox, had and continue to have just and true notions of God and his attributes, appears so plain from the Koran itself, and all the Mahometan divines, that it would be loss of time to refute those who suppose the God of Mahomet to be different from the true God, and only a fictitious deity or idol of his own creation.

2. The existence of angels, and their purity, are absolutely required to be believed in the Koran; and he is reckoned an infidel who denies there are such beings, or hates any of them, or asserts any distinction of sexes among them. They believe them to have pure and subtle bodies, created of fire; that they neither eat nor drink, nor propagate their species; that they have various forms and offices, some adoring God in different postures, others singing praises to him, or interceding for mankind. They hold, that some of them are employed in writing down the actions of men; others in carrying the throne of God, and other services.

The four angels, whom they look on as more eminently in God's favour, and often mention on account of the offices assigned them, are, Gabriel, to whom they give several titles, particularly those of the *holy spirit*, and the *angel of revelations*, supposing him to be honoured by God with a greater confidence than any other, and to be employed in writing down the divine decrees; Michael, the friend and protector of the Jews; Azrael, the *angel of death*, who separates men's souls from their bodies; and Israsil, whose office it will be to sound the trumpet at the resurrection. The Mahometans also believe, that two guardian angels attend on every man, to observe and write down his actions, being changed every day, and therefore carried *al Moakkibat*, or "the angels who continually succeed one another."

The devil, whom Mahomet names *Eblis*, from his *despair*, was once one of those angels who are nearest to God's presence, called *Azazil;* and fell, according to the doctrine of the Koran, for refusing to pay homage to Adam at the command of God.

Besides angels and devils, the Mahometans are taught by the Koran to believe an intermediate order of creatures, which they call *jin* or *genii*, created also of fire, but of a grosser fabric than angels, since they eat and drink, and propagate their species, and are subject to death. Some of these are supposed to be good and others bad, and capable of future salvation or damnation, as men are; whence Mahomet pretended to be sent for the conversion of genii as well as men.

3. As to the Scriptures, the Mahometans are taught by the Koran, that God, in divers ages of the world, gave revelations of his will in writing to several prophets, the whole and every one of which it is absolutely necessary for a good Moslem to believe. The number of these sacred books was, according to them, 104. Of which 10 were given to Adam, 50 to Seth, 30 to Edris or Enoch, 10 to Abraham; and the other four, being the Pentateuch, the Psalms, the Gospel, and the Koran, were successively delivered to Moses, David, Jesus, and Mahomet; which last being the seal of the prophets, those revelations are now closed, and no more are to be expected. All these divine books, except the four last, they agree to be now entirely lost, and their contents unknown; though the Sabians have several books which they attribute to some of the antediluvian prophets. And of those four, the Pentateuch, Psalms, and Gospel, they say, have undergone so many alterations and corruptions, that, though there may possibly be some part of the true word of God therein, yet no credit is to be given to the present copies in the hands of the Jews and Christians. The Mahometans have also a gospel in Arabic, attributed to St Barnabas; wherein the history of Jesus Christ is related in a manner very different from what we find in the true gospels, and correspondent to those traditions which Mahomet has followed in his Koran. Of this gospel the Moriscoes in Africa have a translation in Spanish; and there is, in the library of Prince Eugene of Savoy, a manuscript of some antiquity, containing an Italian translation of the same gospel; made, it is to be supposed, for the use of renegades. This book appears to be no original forgery of the Mahometans; though they have, no doubt, interpolated and altered it since, the better to serve their purpose; and in particular, instead of the *Paraclete*, or *Comforter*, they have in this apocryphal gospel inserted the word *Periclyte*, that is, the "famous," or "illustrious;" by which they pretend their prophet was foretold by name, that being the signification of *Mohammed* in Arabic: and this they say to justify that passage of the Koran, where Jesus Christ is formally asserted to have foretold his coming, under his other name of *Ahmed*, which is derived from the same root as *Mohammed*, and of the same import. From these, or some other forgeries of the same stamp, it is that the Mahometans quote several passages, of which there are not the least footsteps in the New Testament.

4. The number of the prophets, which have been from time to time sent by God into the world, amounts to no less than 224,000, according to one Mahometan tradition; or to 124,000, according to another; among whom 313 were apostles, sent with special commissions to reclaim mankind from infidelity and superstition; and six of them brought new laws or dispensations, which successively abrogated the preceding; these were Adam, Noah, Abraham, Moses, Jesus, and Mahomet. All the prophets in general the Mahometans believe to have been free from great sins and errors of consequence, and professors of one and the same religion, that is, Islam, notwithstanding the different laws and institutions which they observed. They allow of degrees among them, and hold some of them to be more excellent and honourable than others. The first place they give to the revealers

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and establishers of new dispensations, and the next to the apostles.

In this great number of prophets, they not only reekon divers patriarchs and persons named in scripture, but not recorded to have been prophets, (wherein the Jewish and Christian writers have sometimes led the way), as Adam, Seth, Lot, Ishmael, Nun, Joshua, &c. and introduce some of them under different names, as *Enoch*, *Heber*, and *Jethro*, who are called, in the Koran, *Edris*, *Hud*, and *Shoaib:* but several others whose very names do not appear in Scripture (though they endeavour to find some persons there to fix them on), as Saleh, Khedr, Dhu'lkefl, &c.

5. The belief of a general resurrection and a future judgment.

When a corpse is laid in the grave, they say he is received by an angel, who gives him notice of the coming of the two examiners; who are two black livid angels, of a terrible appearance, named *Monker* and *Nakir*. These order the dead person to sit upright; and examine him concerning his faith as to the unity of God, and the mission of Mahomet: if he answer rightly, they suffer the body to rest in peace, and it is refreshed by the air of paradise; but, if not, they beat him on the temples with iron maces, till he roars out for anguish so loud, that he is heard by all from east to west, except men and genii. They then press the earth on the corpse, which is gnawed and stung till the resurrection by 99 dragons, with seven heads each; or, as others say, their sins will become venomous beasts, the grievous ones stinging like dragons, the smaller like scorpions, and the others like serpents: circumstances which some understand in a figurative sense.

As to the soul, they hold, that, when it is separated from the body by the angel of death, who performs his office with ease and gentleness towards the good, and with violence towards the wicked, it enters into that which they call *al berzakh*, or *the interval* between death and the resurrection. If the departed person was a believer, they say two angels meet it, who convey it to heaven, that its place there may be assigned, according to its merit and degree. For they distinguish the souls of the faithful into three classes: The first of prophets, whose souls are admitted into paradise immediately; the second of martyrs, whose spirits, according to a tradition of Mahomet, rest in the crops of green birds, which eat of the fruits and drink of the rivers of paradise; and the third of other believers, concerning the state of whose souls before the resurrection there are various opinions.

Though some among the Mahometans have thought that the resurrection will be merely spiritual, and no more than the returning of the soul to the place whence it first came (an opinion defended by Ebn Sina, and called by some the *opinion of the philosophers*); and others, who allow man to consist of body only, that it will be merely corporeal; the received opinion is, that both body and soul will be raised: and their doctors argue strenuously for the possibility of the resurrection of the body, and dispute with great subtility concerning the manner of it. But Mahomet has taken care to preserve one part of the body, whatever becomes of the rest, to serve for a basis of the future edifice, or rather a leven for the mass which is to be joined to it. For he taught, that a man's body was entirely consumed by the earth, except only the bone called *al ajb*, which we name the *os coccygis*, or rumpbone; and that, as it was the first formed in the human body, it will also remain uncorrupted till the last day, as a seed from whence the whole is to be renewed; and this, he said, would be effected by a forty years rain, which God should send, and which would cover the earth to the height of 12 cubits, and cause the bodies to sprout forth like plants. Herein, also, is Mahomet beholden to the Jews; who say the same things of the bone Luz, excepting that what he attributes to a great rain, will be effected according to them, by a dew impregnating the dust of the earth.

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The time of the resurrection the Mahometans allow to be a perfect secret to all but to God alone; the angel Gabriel himself acknowledging his ignorance in this point, when Mahomet asked him about it. However, they say, the approach of that day may be known from certain signs which are to precede it. These signs they distinguish into two sorts, the lesser and the greater.

The lesser signs are, 1. The decay of faith among men. 2. The advancing of the meanest persons to eminent dignity. 3. That a maid servant shall become the mother of her mistress (or master); by which is meant, either that towards the end of the world men shall be much given to sensuality, or that the Mahometans shall then take many captives. 4. Tumults and seditions. 5. A war with the Turks. 6. Great distress in the world, so that a man, when he passes by another's grave, shall say, Would to God I were in his place! 7. That the provinces of Irac and Syria shall refuse to pay their tribute. And, 8. That the buildings of Medina shall reach to Ahab, or Yahab.

The greater signs are, 1. The sun's rising in the west; which some have imagined it originally did. 2. The appearance of the beast, which shall rise out of the earth, in the temple of Mecca, or on Mount Safa, or in the territory of Tayef, or some other place. This beast, they say, is to be 60 cubits high; though others, not satisfied with so small a size, will have her reach to the clouds and to heaven, when her head only is out; and that she will appear for three days, but show only a third part of her body. They describe this monster, as to her form, to be a compound of various species; having the head of a bull, the eyes of a hog, the ears of an elephant, the horns of a stag, the neck of an ostrich, the breast of a lion, the colour of a tiger, the back of a cat, the tail of a ram, the legs of a camel, and the voice of an ass. Some say this beast is to appear three times in several places, and that she will bring with her the rod of Moses and the seal of Solomon; and being so swift that none can overtake or escape her, will with the first strike all the believers on the face, and mark them with the word *mumen*, i. e. believer; and with the latter will mark the unbelievers on the face likewise, with the word *Cafer*, i. e. infidel, that every person may be known for what he really is. They add, that the same beast is to demonstrate the vanity of all religions except Islam, and to speak Arabic. All this stuff seems to be the result of a confused idea of the beast in the Revelation. 3. War with the Greeks, and the taking Constantinople by 70,000 of the posterity of Isaac, who

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shall not win that city by force of arms, but the walls shall fall down while they cry out, *There is no God but God, God is most great!* As they are dividing the spoil, news will come to them of the appearance of Antichrist; whereupon they shall leave all, and return back. 4. The coming of Antichrist, whom the Mahometans call *Masih al Dajjal*, i. e. the false or lying Christ, and simply *al Dajjal*. He is to be one-eyed, and marked on the forehead with the letters C. F. R. signifying *Cafer*, or infidel. They say that the Jews give him the name of *Messiah Ben David;* and pretend he is to come in the last days, and to be lord both of land and sea, and that he will restore the kingdom to them. 5. The descent of Jesus on earth. They pretend that he is to descend near the white tower to the east of Damascus, when the people are returned from the taking of Constantinople: that he is to embrace the Mahometan religion, marry a wife, get children, kill Antichrist; and at length die after 40 years, or, according to others, 24 years continuance on earth. Under him, they say, there will be great security and plenty in the world, all hatred and malice being laid aside; when lions and camels, bears and sheep, shall live in peace, and a child shall play with serpents unhurt. 6. War with the Jews; of whom the Mahometans are to make a prodigious slaughter, the very trees and stones discovering such of them as hide themselves, except only the tree called *gharkad*, which is the tree of the Jews. 7. The irruption of Gog and Magog, or, as they are called in the east, *Yajuj* and *Majuj;* of whom many things are related in the Koran and the traditions of Mahomet. These barbarians, they tell us, having passed the lake of Tiberias, which the vanguard of their vast army will drink dry, will come to Jerusalem, and there greatly distress Jesus and his companions; till, at his request, God will destroy them, and fill the earth with their carcases, which, after some time, God will send birds to carry away, at the prayers of Jesus and his followers. Their bows, arrows, and quivers, the Moslems will burn for seven years together; and at last God will send a rain to cleanse the earth and to make it fertile. 8. A smoke which shall fill the whole earth. 9. An eclipse of the moon. Mahomet is reported to have said, that there would be three eclipses before the last hour; one to be seen in the east, another in the west, and the third in Arabia. 10. The returning of the Arabs to the worship of Allat and Al Uzza, and the rest of their ancient idols, after the decease of every one in whose heart there was faith equal to a grain of mustard seed, none but the very worst of men being left alive. For God, they say, will send a cold odoriferous wind, blowing from Syria Damascena, which shall sweep away the souls of all the faithful, and the Koran itself, so that men will remain in the grossest ignorance for 100 years. 11. The discovery of a vast heap of gold and silver by the retreating of the Euphrates, which will be the destruction of many. 12. The demolition of the Caaba, or temple of Mecca, by the Ethiopians. 13. The speaking of beasts and inanimate things. 14. The breaking out of fire in the province of Hejaz; or, according to others, in Yaman. 15. The appearance of a man of the descendants of Kahtan, who shall drive men before him with his staff. 16. The coming of the Mohdi, or director; concerning whom Mahomet prophesied, that the world should not have an end till one of his own family should govern the Arabians, whose name should be the same with his own name, and whose father's name should also be the same with his father's name; and who should fill the earth with righteousness. This person the Shiites believe to be now alive, and concealed in some secret place till the time of his manifestation; for they suppose him no other than the last of the 12 imams, named *Mahomet Abu'lkasem*, as their prophet was; and the son of Hassan al Askeri, the 11th of that succession. He was born at Sermanrai, in the 255th year of the Hegira. From this tradition, it is to be presumed, an opinion pretty current among the Christians took its rise, that the Mahometans are in expectation of their prophet's return. 17. A wind which shall sweep away the souls of all who have but a grain of faith in their hearts, as has been mentioned under the tenth sign.

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These are the greater signs, which, according to their doctrine, are to precede the resurrection, but still leave the hour of it uncertain: for the immediate sign of its being come will be the first blast of the trumpet, which they believe will be sounded three times. The first they call the *blast of consternation;* at the hearing of which all creatures in heaven and earth shall be struck with terror, except those whom God shall please to exempt from it. The effects attributed to this first sound of the trumpet are very wonderful: for they say the earth will be shaken, and not only all buildings, but the very mountains levelled; that the heavens shall melt, the sun be darkened, the stars fall, on the death of the angels, who, as some imagine, hold them suspended between heaven and earth; and the sea shall be troubled and dried up, or, according to others, turned into flames, the sun, moon, and stars being thrown into it: the Koran to express the greatness of the terror of that day, adds, that women who give suck shall abandon the care of their infants, and even the she camels which have gone 10 months with young (a most valuable part of the substance of that nation) shall be utterly neglected. A farther effect of this blast will be that concourse of beasts mentioned in the Koran, though some doubt whether it be to precede the resurrection or not. They who suppose it will precede, think that all kinds of animals, forgetting their respective natural fierceness and timidity, will run together into one place, being terrified by the sound of the trumpet and the sudden shock of nature.

The Mahometans believe that this first blast will be followed by a second, which they call the *blast of examination;* by which all creatures both in heaven and earth shall die or be annihilated, except those which God shall please to exempt from the common fate; and this, they say, shall happen in the twinkling of an eye, nay, in an instant; nothing surviving except God alone, with paradise and hell, and the inhabitants of those two places, and the throne of glory. The last who shall die will be the angel of death.

Forty years after this will be heard the *blast of resurrection*, when the trumpet shall be sounded the third time by Israfil, who, together with Gabriel and Michael, will be previously restored to life, and, standing on the rock of the temple of Jerusalem, shall, at God's command, call together all the dry and rotten bones, and other dispersed parts of the bodies, and the very hairs

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hairs to judgment. This angel having, by the divine order, set the trumpet to his mouth, and called together all the souls from all parts, will throw them into his trumpet, from whence, on his giving the last sound, at the command of God, they will fly forth like bees, and fill the whole space between heaven and earth, and then repair to their respective bodies, which the opening earth will suffer to arise; and the first who shall so arise, according to a tradition of Mahomet, will be himself. For this birth the earth will be prepared by the rain above mentioned, which is to fall continually for 40 years, and will resemble the seed of a man, and be supplied from the water under the throne of God, which is called *living water;* by the efficacy and virtue of which the dead bodies shall spring forth from their graves as they did in their mother's womb, or as corn sprouts forth by common rain, till they become perfect; after which breath will be breathed into them, and they will sleep in their sepulchres till they are raised to life at the last trumpet.

When those who have risen shall have waited the limited time, the Mahometans believe God will at length appear to judge them; Mahomet undertaking the office of intercessor, after it shall have been declined by Adam, Noah, Abraham, and Jesus, who shall beg deliverance only for their own souls. They say, that on this solemn occasion God will come in the clouds surrounded by angels, and will produce the books wherein the actions of every person are recorded by their guardian angels, and will command the prophets to bear witness against those to whom they have been respectively sent. Then every one will be examined concerning all his words and actions uttered and done by him in this life; not as if God needed any information in these respects, but to oblige the person to make public confession and acknowledgment of God's justice. The particulars of which they shall give an account, as Mahomet himself enumerated them, are, of their time, how they spent it; of their wealth, by what means they acquired it, and how they employed it; of their bodies, wherein they exercised them; of their knowledge and learning, what use they made of them. To the questions we have mentioned each person shall answer, and make his defence in the best manner he can, endeavouring to excuse himself by casting the blame of his evil deeds on others; so that a dispute shall arise even between the soul and the body, to which of them their guilt ought to be imputed: The soul saying, *O Lord, my body I received from thee; for thou createdst me without a hand to lay hold with, a foot to walk with, an eye to see with, or an understanding to apprehend with, till I came and entered into this body; therefore punish it eternally, but deliver me.* The body, on the other side, will make this apology: *O Lord, thou createdst me like a stock of wood, having neither hand that I could lay hold with, nor foot that I could walk with, till this soul, like a ray of light, entered into me, and my tongue began to speak, my eye to see, and my foot to walk; therefore punish it eternally, but deliver me.* But God will propound to them the following parable of the blind man and the lame man, which, as well as the preceding dispute, was borrowed by the Mahometans from the Jews. A certain king having a pleasant garden, in which were ripe fruits, set two persons to keep it, one of whom was blind, and the other lame; the former not being able to see the fruit, nor the latter to gather it: the lame man, however, seeing the fruit, persuaded the blind man to take him upon his shoulders, and by that means he easily gathered the fruit, which they divided between them. The lord of the garden coming some time after, and inquiring after his fruit, each began to excuse himself: the blind man said he had no eyes to see with; and the lame man, that he had no feet to approach the trees. But the king, ordering the lame man to be set on the blind, passed sentence on and punished them both. And in the same manner will God deal with the body and the soul. As these apologies will not avail on that day, so it will be in vain for any one to deny his evil actions; since men and angels, and his own members, nay, the very earth itself, will be ready to bear witness against him.

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At this examination, they also believe, that each person will have the book wherein all the actions of his life are written delivered to him: which books the righteous will receive into the right hand, and read with great pleasure and satisfaction; but the ungodly will be obliged to take them, against their wills, in their left, which will be bound behind their backs, their right hand being tied up to their necks.

To show the exact justice which will be observed on this great day of trial, the next thing they describe is the balance, wherein all things shall be weighed. They say it will be held by Gabriel; and that it is of so vast a size, that its two scales, one of which hangs over paradise, and the other over hell, are capacious enough to contain both heaven and hell. Though some are willing to understand what is said in the Koran concerning this balance allegorically, and only as a figurative representation of God's equity; yet the more ancient and orthodox opinion is, that they are to be taken literally; and since words and actions, being mere accidents, are not capable of being themselves weighed, they say that the books wherein they are written will be thrown into the scales, and according as those wherein the good or evil actions are recorded shall preponderate, sentence will be given: those whose balances laden with good works shall be heavy, will be saved; but those whose balances are light, will be condemned. Nor will any one have cause to complain that God suffers any good action to pass unrewarded, because the wicked for the good they do have their reward in this life, and therefore can expect no favour in the next.

This examination being past, and every one's works weighed in a just balance, that mutual retaliation will follow, according to which every creature will take vengeance one of another, or have satisfaction made them for the injuries which they have suffered. And, since there will then be no other way of returning like for like, the manner of giving this satisfaction will be by taking away a proportional part of the good works of him who offered the injury, and adding it to those of him who suffered it. Which being done, if the angels (by whose ministry this is to be performed) say, *Lord, we have given to every one his due, and there remaineth of this person's good works so much as equalleth the weight of an ant,* God will, of his mercy, cause it be doubled unto him, that he may be admitted into paradise; but if, on the contrary, his good works be exhausted,

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hausted, and there remain evil works only, and there be any who have not yet received satisfaction from him, God will order that an equal weight of their sins be added unto his, that he may be punished for them in their stead, and he will be sent to hell laden with both. This will be the method of God's dealing with mankind. As to brutes, after they shall have likewise taken vengeance of one another, he shall command them to be changed into dust; wicked men being reserved to more grievous punishment, so that they shall cry out, on hearing this sentence passed on the brutes, *Would to God that we were dust also!* As to the genii, many Mahometans are of opinion, that such of them as are true believers, will undergo the same fate as the irrational animals, and have no other reward than the favour of being converted into dust: and for this they quote the authority of their prophet.

The trials being over, and the assembly dissolved, the Mahometans hold, that those who are to be admitted into paradise will take the right-hand way, and those who are destined to hell-fire will take the left; but both of them must first pass the bridge called in Arabic *al Sirat*, which they say is laid over the midst of hell, and describe to be finer than a hair, and sharper than the edge of a sword; so that it seems very difficult to conceive how any one shall be able to stand upon it; for which reason, most of the sect of the Motazalites reject it as a fable; though the orthodox think it a sufficient proof of the truth of this article, that it was seriously affirmed by him who never asserted a falsehood, meaning their prophet: who, to add to the difficulty of the passage, has likewise declared, that this bridge is beset on each side with briars and hooked thorns; which will however be no impediment to the good; for they shall pass with wonderful ease and swiftness, like lightning, or the wind, Mahomet and his Moslems leading the way; whereas the wicked, what with the slipperiness and extreme narrowness of the path, the entangling of the thorns, and the extinction of the light which directed the former to paradise, will soon miss their footing, and fall down headlong into hell, which is gaping beneath them.

As to the punishment of the wicked, the Mahometans are taught, that hell is divided into seven stories or apartments, one below another, designed for the reception of as many distinct classes of the damned.

The first, which they call *Jehennam*, they say, will be the receptacle of those who acknowledge one God, that is, the wicked Mahometans; who, after having there been punished according to their demerits, will at length be released. The second, named *Ladha*, they assign to the Jews; the third named *al Hotama*, to the Christians; the fourth, named *al Sair*, to the Sabians; the fifth, named *Sakar*, to the Magians; the sixth, named *al Jahim*, to the idolaters; and the seventh, which is the lowest and worst of all, and is called *al Hawyat*, to the hypocrites, or those who outwardly professed some religion, but in their hearts were of none. Over each of these apartments they believe there will be set a guard of angels, 19 in number; to whom the damned will confess the just judgment of God, and beg them to intercede with him for some alleviation of their pain, or that they may be delivered by being annihilated.

Mahomet has, in his Koran and traditions, been very exact in describing the various torments of hell, which, according to him, the wicked will suffer both from intense heat and excessive cold. We shall, however, enter into no detail of them here; but only observe, that the degrees of these pains will also vary in proportion to the crimes of the sufferer, and the apartment he is condemned to; and that he who is punished the most lightly of all will be shod with shoes of fire, the fervour of which will cause his skull to boil like a cauldron. The condition of these unhappy wretches, as the same prophet teaches, cannot be properly called either *life* or *death*; and their misery will be greatly increased by their despair of being ever delivered from that place, since, according to that frequent expression in the Koran, *they must remain therein for ever*. It must be remarked, however, that the infidels alone will be liable to eternity of damnation; for the Moslems, or those who have embraced the true religion, and have been guilty of heinous sins, will be delivered thence after they shall have expiated their crimes by their sufferings. The time which these believers shall be detained there, according to a tradition handed down from their prophet, will not be less than 900 years, nor more than 7000. And, as to the manner of their delivery, they say that they shall be distinguished by the marks of prostration on those parts of their bodies with which they used to touch the ground in prayer, and over which the fire will therefore have no power; and that, being known by this characteristic, they will be released by the mercy of God, at the intercession of Mahomet and the blessed: whereupon those who shall have been dead, will be restored to life, as has been said; and those whose bodies shall have contracted any sootiness or filth from the flames and smoke of hell, will be immersed in one of the rivers of paradise, called the *river of life*, which will wash them whiter than pearls.

The righteous, as the Mahometans are taught to believe, having surmounted the difficulties, and passed the sharp bridge above mentioned, before they enter paradise, will be refreshed by drinking at the *pond* of their prophet, who describes it to be an exact square of a month's journey in compass; its water, which is supplied by two pipes from Al Cawthar, one of the rivers of paradise, being whiter than milk or silver, and more odoriferous than musk, with as many cups set around it as there are stars in the firmament; of which water whoever drinks will thirst no more for ever. This is the first taste which the blessed will have of their future and now near approaching felicity.

Though paradise be so very frequently mentioned in the Koran, yet it is a dispute among the Mahometans whether it be already created, or to be created hereafter; the Motazalites and some other sectaries asserting, that there is not at present any such place in nature, and that the paradise which the righteous will inhabit in the next life will be different from that from which Adam was expelled. However, the orthodox profess the contrary, maintaining that it was created even before the world, and describe it, from their prophet's traditions, in the following manner:

They say it is situated above the seven heavens (or in the seventh heaven), and next under the throne of God; and, to express the amenity of the place, tell us, that the earth of it is of the finest wheat flour, or

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of the purest musk, or, as others will have it, of saffron: that its stones are pearls and jacinths, the walls of its buildings enriched with gold and silver; and that the trunks of all its trees are of gold, among which the most remarkable is the tree called *Tuba*, or the tree of happiness. Concerning this tree, they fable, that it stands in the palace of Mahomet, though a branch of it will reach to the house of every true believer; that it will be laden with pomegranates, grapes, dates, and other fruits, of surprising bigness, and of tastes unknown to mortals. So that if a man desire to eat of any particular kind of fruit, it will immediately be presented him; or, if he choose flesh, birds ready dressed will be set before him, according to his wish. They add, that the boughs of this tree will spontaneously bend down to the hand of the person who would gather of its fruits, and that it will supply the blessed not only with food, but also with silken garments, and beasts to ride on ready saddled and bridled, and adorned with rich trappings, which will burst forth from its fruits; and that this tree is so large, that a person, mounted on the fleetest horse, would not be able to gallop from one end of its shade to the other in 100 years.

As plenty of water is one of the greatest additions to the pleasantness of any place, the Koran often speaks of the rivers of paradise as a principal ornament thereof: some of these rivers, they say, flow with water, some with milk, some with wine, and others with honey; all taking their rise from the root of the tree Tuba.

But all these glories will be eclipsed by the resplendent and ravishing girls of paradise, called from their large black eyes *Hur al oyun*, the enjoyment of whose company will be a principal felicity of the faithful. These, they say, are created, not of clay, as mortal women are, but of pure musk; being, as their prophet often affirms in his Koran, free from all natural impurities, defects, and inconveniences incident to the sex, of the strictest modesty, and secluded from public view in pavilions of hollow pearls, so large, that as some traditions have it, one of them will be no less than four parasangs (or, as others say, 60 miles) long, and as many broad.

The name which the Mahometans usually give to this happy mansion, is *al Jannat*, or "the garden;" and sometimes they call it, with an addition, *Jannat al Ferdaws*, "the garden of paradise;" *Jannat Aden*, "the garden of Eden," (though they generally interpret the word *Eden*, not according to its acceptation in Hebrew, but according to its meaning in their own tongue, wherein it signifies "a settled or perpetual habitation);" *Jannat al Mawa*, "the garden of abode;" *Jannat al Naim*, "the garden of pleasure;" and the like: by which several appellations some understand so many different gardens, or at least places of different degrees of felicity (for they reckon no less than 100 such in all), the very meanest whereof will afford its inhabitants so many pleasures and delights, that one would conclude they must even sink under them, had not Mahomet declared, that, in order to qualify the blessed for a full enjoyment of them, God will give to every one the abilities of 100 men.

6. God's absolute decree and predestination both of good and evil. The orthodox doctrine is, that whatever hath or shall come to pass in this world, whether it be good, or whether it be bad, proceedeth entirely from the divine will, and is irrevocably fixed and recorded from all eternity in the preserved table: God having secretly predetermined not only the adverse and prosperous fortune of every person in this world, in the most minute particulars, but also his faith or infidelity, his obedience or disobedience, and consequently his everlasting happiness or misery after death; which fate or predestination it is not possible by any forcsight or wisdom to avoid. Mahometanism.

Of this doctrine Mahomet makes great use in his Koran for the advancement of his designs; encouraging his followers to fight without fear, and even desperately, for the propagation of their faith, by representing to them, that all their caution could not avert their inevitable destiny, or prolong their lives for a moment; and deterring them from disobeying or rejecting him as an impostor, by setting before them the danger they might thereby incur of being, by the just judgment of God, abandoned to seduction, hardness of heart, and a reprobate mind, as a punishment for their obstinacy.

II. *Religious practice.* 1. The first point is *prayer*, under which are also comprehended those legal washings or purifications which are necessary preparations thereto.

Of these purifications there are two degrees, one called *ghost*, being a total immersion or bathing of the body in water; and the other called *wodu* (by the Persians, *abdest*), which is the washing of their faces, hands, and feet, after a certain manner. The first is required in some extraordinary cases only, as after having lain with a woman, or being polluted by emission of seed, or by approaching a dead body; women also being obliged to it after their courses or childbirth. The latter is the ordinary ablution in common cases, and before prayer, and must necessarily be used by every person before he can enter upon that duty. It is performed with certain formal ceremonies, which have been described by some writers, but much easier apprehended by seeing them done, than by the best description.

That his followers might be more punctual in this duty, Mahomet is said to have declared, that *the practice of religion is founded on cleanliness*, which is the *one half of the faith*, and the *key of prayer*, without which it will not be heard by God. That these expressions may be the better understood, Al Ghazali reckons four degrees of purification; of which the first is the cleansing of the body from all pollution, filth, and excrements; the second, the cleansing of the members of the body from all wickedness and unjust actions; the third, the cleansing the heart from all blameable inclinations and odious vices; and the fourth, the purging a man's secret thoughts from all affections which may divert their attendance on God; adding, that the body is but as the outward shell, in respect to the heart, which is as the kernel.

Circumcision, though it be not so much as once mentioned in the Koran, is yet held by the Mahometans to be an ancient divine institution, confirmed by the religion of Islam, and though not so absolutely necessary but that it may be dispensed with in some cases,

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cases, yet highly proper and expedient. The Arabs used this rite for many ages before Mahomet, having probably learned it from Ishmael, though not only his descendants, but the Hamyarites and other tribes practised the same. The Ishmaelites, we are told, used to circumcise their children, not on the eighth day, as is the custom of the Jews, but when about 12 or 13 years old, at which age their father underwent that operation; and the Mahometans imitate them so far as not to circumcise children before they may be able at least distinctly to pronounce that profession of their faith, *There is no* God *but* God, Mahomet *is the apostle of* God; but pitch on what age they please for the purpose, between 6 and 16 or thereabouts.

Prayer was by Mahomet thought so necessary a duty, that he used to call it *the pillar of religion* and *the key of paradise;* and when the Thakifites, who dwelt at Tayef, sending, in the ninth year of the Hegira, to make their submission to the prophet, after the keeping of their favourite idol had been denied them, begged at least that they might be dispensed with as to their saying of their appointed prayers, he answered, *That there could be no good in that religion wherein was no prayer.*

That so important a duty, therefore, might not be neglected, Mahomet obliged his followers to pray five times every 24 hours, at certain stated times, viz. 1. In the morning before sunrise: 2. When noon is past, and the sun begins to decline from the meridian: 3. In the afternoon, before sunset: 4. In the evening, after sunset, and before the day be shut in; and, 5. After the day is shut in, and before the first watch of the night. For this institution he pretended to have received the divine command from the throne of God himself, when he took his night-journey to heaven; and the observing of the stated times of prayer is frequently insisted on in the Koran, though they be not particularly prescribed therein. Accordingly, at the aforesaid times, of which public notice is given by the Muedhdhins, or Criers, from the steeples of their mosques (for they use no bells), every conscientious Moslem prepares himself for prayer, which he performs either in the mosque or any other place, provided it be clean, after a prescribed form, and with a certain number of praises or ejaculations (which the more scrupulous count by a string of beads), and using certain postures of worship; all which have been particularly set down and described, though with some few mistakes, by other writers, and ought not to be abridged, unless in some special cases, as on a journey, on preparing for battle, &c.

For the regular performance of the duty of prayer among the Mahometans, besides the particulars above mentioned, it is also requisite that they turn their faces, while they pray, towards the temple of Mecca; the quarter where the same is situated, being, for that reason, pointed out within their mosques by a niche, which they call *al Mehrab;* and without, by the situation of the doors opening into the galleries of the steeples: there are also tables calculated for the ready finding out their Keblah, or part towards which they ought to pray, in places where they have no other direction.

2. *Alms* are of two sorts, *legal* and *voluntary.* The *legal alms* are of indispensable obligation, being commanded by the law, which directs and determines both the portion which is to be given, and of what things it ought to be given; but the *voluntary alms* are left to every one's liberty, to give more or less as he shall see fit. The former kind of alms some think to be properly called *zacat*, and the latter *sadakat;* though this name be also frequently given to the legal alms. They are called *zacat*, either because they *increase* a man's store by drawing down a blessing thereon, and produce in his soul the virtue of liberality; or because they *purify* the remaining part of one's substance from pollution, and the soul from the filth of avarice; and *sadakat*, because they are a proof of a man's sincerity in the worship of God. Some writers have called the legal alms *tithes;* but improperly, since in some cases they fall short, and in others exceed that proportion.

3. *Fasting* is a duty of so great moment, that Mahomet used to say it was *the gate of religion*, and that the *odour of the mouth of him who fasteth is more grateful to* God *than that of musk;* and Al Ghazali reckons fasting *one-fourth part of the faith.* According to the Mahometan divines there are three degrees of fasting: 1. The restraining the belly and other parts of the body from satisfying their lusts: 2. The restraining the ears, eyes, tongue, hands, feet, and other members, from sin; and, 3. The fasting of the heart from worldly cares, and restraining the thought from every thing besides God.

The Mahometans are obliged, by the express command of the Koran, to fast the whole month of Ramadan from the time the new moon first appears, till the appearance of the next new moon; during which time they must abstain from eating, drinking, and women, from daybreak till night or sunset. And this injunction they observe so strictly, that, while they fast, they suffer nothing to enter their mouths, or other parts of their body, esteeming the fast broken and null, if they smell perfumes, take a clyster or injection, bathe, or even purposely swallow their spittle; some being so cautious, that they will not open their mouths to speak lest they should breathe the air too freely: the fast is also deemed void, if a man kiss or touch a woman, or if he vomit designedly. But after sunset they are allowed to refresh themselves, and to eat and drink, and enjoy the company of their wives till daybreak; though the more rigid begin the fast again at midnight. This fast is extremely rigorous and mortifying when the month of Ramadan happens to fall in summer (for the Arabian year being lunar, each month runs through all the different seasons in the course of 33 years), the length and heat of the days making the observance of it much more difficult and uneasy than in winter.

The reason given why the month of Ramadan was pitched on for this purpose is, that on that month the Koran was sent down from heaven. Some pretend, that Abraham, Moses, and Jesus, received their respective revelations in the same month.

4. The pilgrimage to Mecca is so necessary a point of practice, that according to a tradition of Mahomet, he who dies without performing it may as well die a Jew or a Christian; and the same is expressly commanded in the Koran.

The temple of Mecca stands in the midst of the city, and is honoured with the title of *Masjad al eharam*, i. e. *the sacred or inviolable temple.* What is principal-

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ly reverenced in this place, and gives sanctity to the whole, is a square stone building, called the CAABA; (see that article.)

To this temple every Mahometan, who has health and means sufficient, ought, once at least in his life, to go on pilgrimage; nor are women excused from the performance of this duty. The pilgrims meet at different places near Mecca, according to the different parts from whence they come, during the months of Shawal and Dhu'lkaada; being obliged to be there by the beginning of Dhu'lhajja; which month, as its name imports, is peculiarly set apart for the celebration of this solemnity.

At the place above mentioned the pilgrims properly commence such; when the men put on the Ihram or sacred habit, which consists only of two woollen wrappers, one wrapped about their middle to cover their privities, and the other thrown over their shoulders, having their heads bare, and a kind of slippers which cover neither the heel nor the instep, and so enter the sacred territory in their way to Mecca. While they have this habit on, they must neither hunt nor fowl, (though they are allowed to fish); which precept is so punctually observed, that they will not kill even a louse or flea if they find them on their bodies: there are some noxious animals, however, which they have permission to kill during their pilgrimage, as kites, ravens, scorpions, mice, and dogs given to bite. During the pilgrimage, it behoves a man to have a constant guard over his words and actions; to avoid all quarrelling or ill language, all converse with women, and all obscene discourse; and to apply his whole attention to the good work he is engaged in.

The pilgrims, being arrived at Mecca, immediately visit the temple; and then enter on the performance of the prescribed ceremonies, which consist chiefly in going in procession round the Caaba, in running between the mounts Safa and Merwa, in making the station on Mount Arafat, and slaying the victims, and shaving their heads in the valley of Mina.

In compassing the Caaba, which they do seven times, beginning at the corner where the black stone is fixed, they use a short quick pace the three first times they go round it, and a grave ordinary pace the four last; which, it is said, was ordered by Mahomet, that his followers might show themselves strong and active, to cut off the hopes of the infidels, who gave out that the immoderate heats of Medina had rendered them weak. But the aforesaid quick pace they are not obliged to use every time they perform this piece of devotion, but only at some particular times. So often as they pass by the black stone, they either kiss it, or touch it with their hand, and kiss that.

The running between Safa and Merwa is also performed seven times, partly with a slow pace and partly running: for they walk gravely till they come to a place between two pillars; and there they run, and afterwards walk again; sometimes looking back, and sometimes stooping, like one who had lost something, to represent Hagar seeking water for her son: for the ceremony is said to be as ancient as her time.

On the ninth of Dhu'lhajja, after morning prayer, the pilgrims leave the valley of Mina, whither they come the day before; and proceed in a tumultuous and rushing manner to Mount Arafat, where they stay to perform their devotions till sunset: then they go to Mozdalifa, an oratory between Arafat and Mina; and there spend the night in prayer and reading the Koran. The next morning by daybreak they visit *al Masher al Karam*, or "the sacred monument;" and, departing thence before sunrise, haste by Batn Mehasser to the valley of Mina, where they throw seven stones at three marks or pillars, in imitation of Abraham, who, meeting the devil in that place, and being by him disturbed in his devotions, or tempted to disobedience when he was going to sacrifice his son, was commanded by God to drive him away by throwing stones at him; though others pretend this rite to be as old as Adam, who also put the devil to flight in the same place, and by the same means.

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This ceremony being over, on the same day, the tenth of Dhu'lhajja, the pilgrims slay their victims in the said valley of Mina; of which they and their friends eat part, and the rest is given to the poor. These victims must be either sheep, goats, kine, or camels: males, if of either of the two former kinds; and females if of either of the latter; and of a fit age. The sacrifices being over, they shave their heads and cut their nails, burying them in the same place; after which the pilgrimage is looked on as completed: though they again visit the Caaba, to take their leave of that sacred building.

The rapid success which attended the propagation of this new religion was owing to causes that are plain and evident, and must remove, or rather prevent, our surprise, when they are attentively considered. The terror of Mahomet's arms, and the repeated victories which were gained by him and his successors, were, no doubt, the irresistible arguments that persuaded such multitudes to embrace his religion and submit to his dominion. Besides, his law was artfully and marvellously adapted to the corrupt nature of man; and, in a more particular manner, to the manners and opinions of the eastern nations, and the vices to which they were naturally addicted: for the articles of faith which it proposed were few in number, and extremely simple; and the duties it required were neither many nor difficult, nor such as were incompatible with the empire of appetites and passions. It is to be observed farther, that the gross ignorance, under which the Arabians, Syrians, Persians, and the greatest part of the eastern nations, laboured at this time, rendered many an easy prey to the artifice and eloquence of this bold adventurer. To these causes of the progress of Mahometanism, we may add the bitter dissensions and cruel animosities that reigned among the Christian sects, particularly the Greeks, Nestorians, Eutychians, and Monophysites; dissensions that filled a great part of the east with carnage, assassinations, and such detestable enormities as rendered the very name of Christianity odious to many. We might add here, that the Monophysites and Nestorians, full of resentment against the Greeks, from whom they had suffered the bitterest and most injurious treatment, assisted the Arabians in the conquest of several provinces, into which, of consequence, the religion of Mahomet was afterwards introduced. Other causes of the sudden progress of that religion will naturally occur to such as consider attentively its spirit and genius, and the state of the world at this time.

MAHOMETANS,

Mahometans || Mahwah.

MAHOMETANS, those who believe in the religion and divine mission of Mahomet. See MAHOMET, MAHOMETANISM, and ALCORAN.

MAHRATTA. See MARHATTA.

MAHWAH, or MAWEE, in *Botany*; an East Indian tree, so called by the natives of Bahar and the neighbouring countries, but of which the Shanscrit name is *Madhuca*, or *Madhudruma*. According to Lieut. C. Hamilton, by whom a very particular account of this tree is given in the Asiatic Researches*, it is of the class of the polyandria-monogynia of Linnæus, but of a genus not described by him.

* Vol. I. art. xiv.

The tree, when full grown, is about the size of a common mango tree, with a bushy head and oval leaves a little pointed; its roots spreading horizontally, are sunk but little in the earth; the trunk, which is often of a considerable thickness, rises seldom to any great height, without giving off branches; it is, however, not uncommon to see it shoot up clear to the length of eight or ten feet: the wood itself is moderately hard, fine grained, and of a reddish colour. By incision the tree affords a resinous gum from the bark.

The flowers are of a nature very extraordinary, "differing essentially (says Mr Hamilton) from those of any other plant with which I am acquainted, as they have not, in any respect, the usual appearance of such, but rather resemble *berries*; and I, like many others, had long conceived them to be the fruit of the Mahwah." The tree drops its leaves in the month of February, and early in March these flowers begin to come out in clusters of thirty, forty, or fifty, from the extremity of every small branch; and, from this period till the latter end of April, as the flowers come to maturity (for they never open or expand), they continue falling off, with their antheræ, in the mornings, a little after sunrise; when they are gathered; and afterwards dried by an exposure of a few days in the sun: when thus prepared, they very much resemble a dried grape, both in taste and flavour. Immediately after the flowers drop off, fresh shoots are made for the new leaves, which soon make their appearance, coming presently to their full growth.

The fruit (*properly* so called) is of two sorts in shape; the one resembling a small walnut, the other somewhat larger and pointed: it is ripe towards the middle of May; and continues dripping from the tree till the whole fall, which is generally about the beginning or towards the middle of June. The outer covering, or *pericarpium*, which is of a soft texture, commonly bursts in the fall, so that the seeds are very easily squeezed out of it: the seeds are somewhat of the shape, but longer than an olive. These seeds are replete with a thick oil, of the consistence of butter or *ghee*, which is obtained by expression.

From this description it may easily be conceived, that the Mahwah tree and its productions are of singular and general use, especially in those dry and barren countries, which, from the nature of their situation, are not so well calculated for producing in plenty or perfection the other necessaries of life.

The corolla or flowers, after being dried as before described, are eaten by the natives raw or dressed with their *curries*; and, when even simply boiled with rice, they afford a strengthening and wholesome nourishment. They are indeed, our author tells us, often applied to a less laudable purpose; for being fermented, they yield by distillation a strong spirit, which the people here sell so very cheap, that for one *pice* (about a halfpenny) may be purchased no less than a *cutcha-seer* (above a pint English) with which any man may get completely drunk. These flowers make an article of trade; being exported from this country to Patna and elsewhere in no inconsiderable quantities. Mahwah || Maiden.

The oil yielded by the fruit, as before mentioned, resembles ghee so much, that, being cheaper, the natives often mix it with that commodity. They use it the same as ghee in their victuals, and in the composition of some sorts of sweetmeats; and burn it in their lamps. It is also regarded as a salutary remedy, applied exteriorly to wounds and all cutaneous eruptions. It is at first of the consistence of common oil, but soon coagulates: after being kept for some time, it acquires a bitterish taste and rancid smell, which renders it somewhat less agreeable as an article of food: but this is an inconvenience which, by the oil being properly clarified and prepared at first, might be perhaps avoided. This oil is also exported both in its adulterated and original state to Patna and other parts of the low country. The gum has not been applied to any use: but might be collected in large quantities in the months of March and April, about the time the flowers come out.

MAIA, in fabulous history, the daughter of Atlas and Pleione. She was the mother of Mercury by Jupiter. She was one of the Pleiades, the most luminous of the seven sisters; (see PLEIADES). Also, a surname of Cybele.

MAIDEN, an instrument for beheading criminals.

Of the use and form of this instrument Mr Pennant gives the following account: "It seems to have been confined to the limits of the forest of Hardwick, or the 18 towns and hamlets within its precincts. The time when this custom took place is unknown; whether Earl Warren, lord of this forest, might have established it among the sanguinary laws then in use against the invaders of the hunting rights, or whether it might not take place after the woollen manufactures at Halifax began to gain strength, is uncertain. The last is very probable; for the wild country around the town was inhabited by a lawless set, whose depredations on the cloth-tenters might soon stifle the efforts of infant industry. For the protection of trade, and for the greater terror of offenders by speedy execution, this custom seems to have been established, so as at last to receive the force of law, which was, 'That if a felon be taken within the liberty of the forest of Hardwick, with goods stolen out, or within the said precincts, either hand-habend, back-berand, or confession'd, to the value of thirteen pence halfpenny, he shall, after three market days or meeting-days within the town of Halifax, next after such his apprehension, and being condemned, be taken to the gibbet, and there have his head cut from his body."

"The offender had always a fair trial; for as soon as he was taken, he was brought to the lord's bailiff at Halifax: he was then exposed on the three markets (which here were held thrice in a week), placed in a stocks, with the goods stolen on his back, or, if the theft was of the cattle kind, they were placed by him; and this was done both to strike terror into others, and

Maiden || Maiden-head.

and to produce new informations against him. The bailiff then summoned four freeholders of each town within the forest to form a jury. The felon and prosecutors were brought face to face; and the goods, the cow or horse, or whatsoever was stolen, produced. If he was found guilty, he was remanded to prison, had a week's time allowed for preparation, and then was conveyed to this spot, where his head was struck off by this machine. I should have premised, that if the criminal, either after apprehension, or in the way to execution, should escape out of the limits of the forest (part being close to the town), the bailiff had no farther power over him; but if he should be caught within the precincts at any time after, he was immediately executed on his former sentence.

"This privilege was very freely used during the reign of Elizabeth: the records before that time were lost. Twenty-five suffered in her reign, and at least 12 from 1623 to 1650; after which I believe the privilege was no more exerted.

"This machine of death is now destroyed; but I saw one of the same kind in a room under the parliament house at Edinburgh, where it was introduced by the regent Morton, who took a model of it as he passed through Halifax, and at length suffered by it himself. It is in form of a painter's easel, and about ten feet high: at four feet from the bottom is a cross bar on which the felon lays his head, which is kept down by another placed above. In the inner edges of the frame are grooves; in these is placed a sharp axe, with a vast weight of lead, supported at the very summit with a peg: to that peg is fastened a cord, which the executioner cutting, the axe falls, and does the affair effectually, without suffering the unhappy criminal to undergo a repetition of strokes, as has been the case in the common method. I must add, that if the sufferer is condemned for stealing a horse or a cow, the string is tied to the beast, which, on being whipped, pulls out this peg, and becomes the executioner." This apparatus is now in possession of the Scottish Antiquarian Society.

MAIDEN is also the name of a machine first used in Yorkshire, and since introduced into other places, for washing linen; consisting of a tub 19 inches high, and 27 in diameter at the top, in which the linen is put, with hot water and soap, to which is adapted a cover, fitting it very closely, and fastened to the tub by two wedges; through a hole in the middle of the cover passes an upright piece of wood, kept at a proper height by a peg above, and furnished with two handles, by which it is turned backward and forward: to the lower end of this upright piece is fastened a round piece of wood, in which are fixed several pieces, like cogs of a wheel. The operation of this machine is to make the linen pass and repass quick through the water.

MAIDEN-Rents, in our old writers, a noble paid by the tenants of some manors on their marriage. This was said to be given to the lord for his omitting the custom of marcheta, whereby he was to have the first night's lodging with his tenant's wife; but it seems more probably to have been a fine for a license to marry a daughter.

MAIDENHEAD, a town of Berks, 26 miles from London, with a stone bridge over the Thames. It is governed by a high steward, a mayor, a steward, and 10 aldermen, out of which last two bridgemasters are chosen every year. Here is a gaol both for debtors and felons. The town stands partly in the parish of Bray and partly in that of Cookham; and here is a chapel peculiar to the corporation, the minister whereof is chosen by the inhabitants, and not obliged to attend the bishop's visitation. Here are several alms-houses and charities. This town, now so considerable, did not begin to flourish till, by the building of its bridge, travellers were brought this way, who before used a ferry at that called *Babham's End*, two miles north of it. The large pier bridge is maintained by the corporation, for which they are allowed the tolls both over and under it. The bridge pier divides Berks from Bucks. There is a great trade here in malt, meal, and timber, which they carry in their barges to London. As this is the great thoroughfare from thence to Bath, Bristol, and other south-west parts of England, the adjacent wood or thicket has been noted for many robberies. The market is on Wednesdays. The population in 1811 was 792.

Maiden-head || Maignan.

MAIDSTONE, a town of Kent, in England, 36 miles from London, seated on the river Medway, a branch of which runs through it. It is a corporation, sends two members to parliament, and in 1811 contained 9443 inhabitants. Its chief trade, besides linen-thread, which is made in great perfection, is in hops; of which there are many plantations about the town, as well as orchards of cherries. The tide flows quite up to the town, and brings up barges, &c. of 50 or 60 tons. It has a fine stone bridge. One of the public gaols for the county is kept in this town; and the custody of weights and measures, renewed by the standard of King Henry VII. was committed to it by parliament, as being in the centre of Kent; for which reason the knights of the shire are always elected, and the courts of justice always held here, and generally the assizes. The archbishop of Canterbury is constant parson of this parish, which is his peculiar, and served by his curate. Here are four charity-schools, in which are above 100 boys and girls, who are visited once a-week and catechised by the minister. This is such a plentiful country, and the lands hereabouts are so rich, that London is supplied with more commodities from hence than from any market town in England; particularly with the large bullocks that come from the Weald of Kent, which begins but six miles off; with timber, wheat, and great quantities of hops, apples, and cherries; with a sort of paving stone, eight or ten inches square, that is exceeding durable; and with the fine white sand for glass-houses and stationers. There are so many gentlemen's seats within 10 miles, that it is rare to find a town of so much trade and business, so full of gentry and good company.

MAIENNE, a considerable, handsome, and populous town in France, formerly having the title of a duchy; seated on a river of the same name, in W. Long. 0. 35. N. Lat. 48. 18.

MAIGNAN, EMANUEL, a religious Minim, and a philosopher of considerable eminence, was born of an ancient and noble family at Thoulouse in 1601. Like the famous Pascal, he became a complete mathematician without the assistance of a teacher; and filled the professor's chair at Rome in 1636, where, at the expence

Maignan || Mail.

expence of Cardinal Spada, he published his book *De Perspectiva Horaria*. He returned to Thoulouse in 1650, and was created provincial: the king, who in 1660 entertained himself with the machines and curiosities in his cell, made him offers by Cardinal Mazarine, to draw him to Paris; but he humbly desired to spend the remainder of his days in a cloister. He published a course of philosophy, 4 vols. 8vo, at Thoulouse; to the second edition of which he added two treatises, one against the vortices of Descartes, and the other on the speaking trumpet invented by Sir Samuel Morland. He is said to have studied even in his sleep, his very dreams being employed in theorems, the demonstrations of which would awaken him with joy. He died in 1676.

MAJESTY, a title given to kings, which frequently serves as a term of distinction. The word seems composed of the two Latin words, *major*, "greater," and *status*, "state." The emperor is called *Sacred Majesty*, *Imperial Majesty*, and *Cæsarean Majesty*: The king of Hungary is styled *His Apostolic Majesty*. The king of Spain is termed *His most Catholic Majesty*: and the king of Portugal, *His most Faithful Majesty*. The king of France used to be called *His most Christian Majesty*; and when he treated with the emperor, the word *Sacred* was added: He was afterwards called simply *King of the French*. Bonaparte assumed the title of *Emperor and King of France*.—With respect to other kings, the name of the kingdom is added; as, *His Britannic Majesty*, *His Prussian Majesty*, &c. Formerly princes were more sparing in giving titles, and more modest in claiming them: before the reign of Charles V. the king of Spain had only the title of *Highness*; and before that of Henry VIII. the kings of England were only addressed under the titles of *Grace* and *Highness*.

Under the Roman republic, the title *Majesty*, (*majestas*) belonged to the whole body of the people, and to the principal magistrates; so that to diminish or wound the majesty of the commonwealth, was to be wanting in respect to the state or to its ministers. But the power afterwards passing into the hands of a single person, the appellation of *Majesty* was transferred to the emperor and the imperial family. Pliny compliments Trajan on his being contented with the title of *Greatness*; and speaks very invidiously of those who affected that of *Majesty*. And yet this last seems to be the most modest and just title that can be attributed to sovereigns, since it signifies no more than the royalty or sovereign power.

MAII INDUCTIO, an ancient custom for the priest and people of country-villages to go in procession to some adjoining wood on a May-day morning; and return in a kind of triumph, with a May-pole, boughs, flowers, garlands, and other tokens of the spring. This May-game, or rejoicing at the coming of the spring, was for a long time observed, and still is in some parts of England; but there was thought to be so much heathen vanity in it, that it was condemned and prohibited within the diocese of Lincoln by the good old Bishop Grosthead.

MAIL (*maille*), a term primarily applied to the meshes or holes in net-work.

Coat of MAIL. See COAT. It is called also a *habergeon*. Anciently they also wore shirts of mail under the waistcoat, to serve as a defence against swords and poniards. We also read of gloves of mail.

Mail || Maillet.

MAIL, or *Mall*, also signifies a round ring of iron; whence the play of pall-mall, from *palla* "a ball," and *maille*, "the round ring through which it is to pass."

MAIL, or *Maille*, in our old writers, a small kind of money. Silver halfpence were likewise termed *Mailles*, 9 Henry V. By indenture in the mint, a pound weight of old sterling silver was to be coined into 360 sterlings or pennies, or 720 *mails* or half-pennies, or 1440 farthings. Hence the word *mail* was derived, which is now vulgarly used in Scotland to signify an annual rent.

MAIL, or *Maill*, on ship-board, a square machine composed of a number of rings interwoven net-wise, and used for rubbing off the loose hemp which remains on lines or white cordage after it is made.

MAIL is likewise used for the leather bag wherein letters are carried by the post.

MAIL-Coaches. See COACH.

Action of MAILS *and Duties*, in *Scots Law*. See LAW, p. 689, § 20.

MAIL, *Black*. See *BLACK-Mail*.

MAILLA, JOSEPH ANNE MARIE DE MOYRIAC DE, a learned Jesuit, was born in the castle of Maillac in the Bugey, and appointed a missionary to China, whither he went in 1703. At the age of 28 he had acquired so great a skill in the characters, arts, sciences, mythology, and ancient books of the Chinese, as to astonish even the learned. He was greatly beloved and esteemed by the emperor Kham-Hi, who died in 1722. He, together with other missionaries, was employed by that prince to draw a chart of China and Chinese Tartary, which was engraven in France in the year 1732. He drew likewise particular charts of some of the provinces of this vast empire; with which the emperor was so pleased, that he settled the author at his court. The great annals of China were also translated into French by Father Mailla, and his manuscript was transmitted to France in 1737. This work was published in 12 volumes quarto, under the inspection of M. Grosier, and is the first complete history of that extensive empire. The style, which was full of hyperbole and bombast, has been revised by the editor, and the speeches which extended to too great a length, and had too much sameness in them, have been omitted. Father Mailla, after having resided 45 years in China, died at Pekin on the 28th of June 1748, in the 79th year of his age. Kien-Lung the reigning emperor paid the expences of his funeral. He was a man of a lively and gentle character, capable of the most persevering labour and the most unremitting activity.

MAILLET, BENOIT DE, descended from a noble family in Lorrain, was born in 1659, and appointed, at the age of 33, consul-general for Egypt. He fulfilled this office for 16 years with great ability, supported the king's authority against the janizaries, and greatly extended the trade of France into that part of Africa. As a recompense for his services, the king bestowed upon him the consulship of Leghorn, which is the first and most considerable consulship in his gift. Being at last appointed in 1715 to visit the

Maillet, Maim.

sea-ports in the Levant and on the coast of Barbary, he was so successful in the execution of his commission, that he obtained permission to retire with a considerable pension. He settled at Marseilles; where he died in 1738, in the 79th year of his age. He was a man of a lively imagination, and gentle manners; in society he was very amiable, and he possessed the strictest probity. He was fond of praise, and very anxious about the reputation of genius. During the whole of his life he paid particular attention to the study of natural history; and his principal object was to become acquainted with the origin of our globe. On this important subject he left some curious observations, which have been published in octavo under the title of *Telliamed*, which is the name *de Maillet* written backwards. The editor Abbé Mascrier has given to this work the form of dialogue. An Indian philosopher is introduced as explaining to a French missionary his opinion concerning the nature of the globe, and the origin of mankind; and, which is very incredible, he supposes it to have come out of the waters, and makes an abode uninhabitable by man the birthplace of the human race. His great object is to prove, that all the strata of which this globe is composed, even to the tops of the highest mountains, have come from the bosom of the waters; that they are the work of the sea, which continually retires to allow them gradually to appear. Telliamed dedicated his book to the illustrious Cyrano de Bergerac, author of the imaginary "Travels to the sun and moon." In the humorous epistle which is addressed to him, the Indian philosopher informs us that these dialogues are nothing but a collection of dreams and fancies. He cannot be accused of having broken his word; but he may well be reproached with not having written them in the same style with his letter to Cyrano, and with not having displayed equal liveliness and humour. A subject the most extravagant is handled in the gravest manner, and his ridiculous opinion is delivered with all the serious air of a philosopher. Of the six dialogues which compose the work, the four first contain many curious observations truly philosophical and important: in the other two we find nothing but conjectures, fancies, and fables, sometimes amusing, but always absurd. To Maillet we are indebted also for "A Description of Egypt," collected from his memoirs by the editor of Telliamed, 1743, 4to, or in 2 vols. 12mo.

MAIM, MAIHEM, or *Mayhem*, in *Law*, a wound by which a person loses the use of a member that might have been a defence to him; as when a bone is broken, a foot, hand, or other member cut off, or an eye put out; though the cutting off an ear or nose, or breaking the hinder-teeth, was formerly held to be no maim. A maim by castration was anciently punished with death, and other maims with loss of member for member; but afterwards they were only punished by fine and imprisonment. It is now enacted by the statute 22 and 23 Car. II. that if any person, from malice aforethought, shall disable any limb or member of any of the king's subjects with an intent to disfigure him, the offender, with his aiders and abettors, shall be guilty of felony without benefit of clergy; though no such attainder shall corrupt the blood, or occasion forfeiture of lands, &c.

Maimonides || Mainprize

MAIMONIDES, MOSES, or MOSES THE SON OF MAIMON, a celebrated rabbi, called by the Jews *the eagle of the doctors*, was born of an illustrious family at Cordova in Spain, in 1131. The early part of his education was undertaken by his father, who afterwards placed him under the tuition of Rabbi Joseph, the son of Megas, a person on whose profound learning he has bestowed the highest praise; and according to Leo Africanus, he had also among his tutors the learned Arabians Ibn Thophail and Averroes. He is commonly named *Moses Ægyptius*, because he settled in Egypt, where he spent his whole life in quality of physician to the sultan. Here he opened a school, which was soon filled with pupils from all parts, from Alexandria and Damascus especially, whose proficiency under him spread his fame all over the world. He was no less eminent in philosophy, mathematics, and divinity, than in medicine. Casaubon affirms it may be truly said of him, as Pliny of old said of Diodorus Siculus, that "he was the first of his tribe who ceased to be a trifler." It would be tedious to enumerate all the works of Maimonides; some were written originally in Arabic, but are now extant only in Hebrew translations. "Those (says Collier) who desire to learn the doctrine and the canon law contained in the Talmud, may read Maimonides's compendium of it in good Hebrew, in his book entitled *Iad*; wherein they will find great part of the fables and impertinencies in the Talmud entirely discarded. But the *More Nevochim* is the most valued of all his works; designed to explain the obscure words, phrases, metaphors, &c. in scripture, which, when literally interpreted, have either no meaning or appear absurd.

MAIN, an epithet usually applied by sailors to whatever is principal, as opposed to whatever is inferior or secondary. Thus the main land is used in contradistinction to an island or peninsula; and the main mast, the main wale, the main keel, and the main hatchway, are in like manner distinguished from the fore and mizen masts, the channel wales, the false keel, and the fore and after hatchways, &c.

MAINOUR, MANOUR, or *Meimour* (from the French, *manier*, i. e. *manu tractare*), in a legal sense denotes the thing that a thief taketh away or stealeth: As to be taken with the mainour (*Pl. Cor.* fol. 179.), is to be taken with the thing stolen about him: And again (fol. 194.) it was presented, that a thief was delivered to the sheriff or viscount, together with the mainour: And again (fol. 186.), if a man be indicted, that he feloniously stole the goods of another, where, in truth, they are his own goods, and the goods be brought into the court as the mainour; and if it be demanded of him, what he saith to the goods, and he disclaim them; though he be acquitted of the felony, he shall lose the goods: And again (fol. 149.), if the defendant were taken with the mainour, and the mainour be carried to the court, they, in ancient times, would arraign him upon the mainour, without any appeal or indictment. Cowel. See *Blackst. Comment.* vol. iii. p. 71. vol. iv. p. 303.

MAINPRIZE. See *False IMPRISONMENT*.

The writ of mainprize, *manucaptio*, is a writ directed to the sheriff (either generally, when any man is imprisoned for a bailable offence, and bail hath been refused; or specially, when the offence or cause of commitment

Mainprize || Maintenon.

commitment is not properly bailable below), commanding him to take sureties for the prisoner's appearance, usually called *mainpernors*, and to set him at large. Mainpernors differ from bail, in that a man's bail may imprison or surrender him up before the stipulated day of appearance; mainpernors can do neither, but are barely sureties for his appearance at the day: bail are only sureties that the parties be answerable for the special matter for which they stipulate; mainpernors are bound to produce him to answer all charges whatever. See *Habeas Corpus*.

MAINTENANCE, in *Law*, bears a near relation to Barretry; being an officious intermeddling in a suit that no way belongs to one, by maintaining or assisting either party with money or otherwise, to prosecute or defend it: a practice that was greatly encouraged by the first introduction of uses. This is an offence against public justice, as it keeps alive strife and contention, and perverts the remedial process of the law into an engine of oppression. And therefore, by the Roman law, it was a species of the *crimen falsi*, to enter into any confederacy, or do any act to support another's law suit, by money, witnesses, or patronage. A man may, however, maintain the suit of his near kinsman, servant, or poor neighbour, out of charity and compassion, with impunity. Otherwise the punishment by common law is fine and imprisonment; and by the statute 32 Henry VIII. c. 9. a forfeiture of 10l.

MAINTENON, Madame de, a French lady of extraordinary fortune, descended from an ancient family, and whose proper name was *Frances d' Aubigné*, was born in 1635. Her parents by misfortunes being ill able to support her, she fell to the care of her mother's relations; to escape which state of dependence, she was induced to marry that famous old buffoon the Abbé Scarron, who subsisted himself only on a pension allowed him by the court for his wit and parts. She lived with him many years, which Voltaire makes no scruple to call the happiest years of her life; but when he died in 1660, she found herself as indigent as she had been before her marriage. Her friends indeed endeavoured to get her husband's pension continued to her, and presented so many petitions to the king about it, all beginning with "The widow Scarron most humbly prays your majesty's," &c. that he was quite weary of them, and has been heard to exclaim, "Must I always be pestered with the widow Scarron?" At last, however, through the recommendation of Madame de Montespan, he settled a much larger pension on her, with a genteel apology for making her wait so long; and afterward made choice of her to take care of the education of the young duke of Maine, his son by Madame de Montespan. The letters she wrote on this occasion charmed the king, and were the origin of her advancement; her personal merit effected all the rest. He bought her the lands of Maintenon, the only estate she ever had; and finding her pleased with the acquisition, called her publicly *Madame de Maintenon;* which was of great service to her in her good fortune, by releasing her from the ridicule attending that of Scarron. Her elevation was to her only a retreat; the king came to her apartment every day after dinner, before and after supper, and continued there till midnight: here he did business with his ministers, while Madame de Maintenon, employed in reading or needle-work, never showed any desire to talk of state affairs, and carefully avoided all appearance of cabal or intrigue; she did not even make use of her power to dignify her own relations. About the latter end of the year 1685, Louis XIV. married her, he being then in his 48th and she in her 50th year; and that piety with which she inspired the king to make her a wife instead of a mistress, became by degrees a settled disposition of mind. She prevailed on Louis to found a religious community at St Cyr, for the education of 300 young ladies of quality; and here she frequently retired from that melancholy of which she complains so pathetically in one of her letters, and which few ladies will suppose she should be liable to in such an elevated situation. But, as M. Voltaire says, if any thing could show the vanity of ambition, it would certainly be this letter. Madame de Maintenon could have no other uneasiness than the uniformity of her manner of living with a great king; and this made her once say to the count D'Aubigné her brother, "I can hold it no longer; I wish I was dead." The answer he made to her was, "You have then a promise to marry the Almighty!" Louis, however, died before her in 1715; when she retired wholly to St Cyr, and spent the rest of her days in acts of devotion; and what is most surprising is, that her husband left no certain provision for her, recommending her only to the duke of Orleans. She would accept no more than a pension of 80,000 livres, which was punctually paid her till she died in 1719. A collection of her letters has been published, and translated into English; from which familiar intercourses her character will be better known than from description.

Maintenon. Major.

MAJOR, in the art of war, the name of several officers of very different ranks and functions.

Major-general. See General.

Major of a Regiment of Foot, the next officer to the lieutenant-colonel, generally promoted from the eldest captain: he is to take care that the regiment be well exercised, to see it march in good order, and to rally it in case of being broken in action: he is the only officer among the infantry that is allowed to be on horseback in time of action, that he may the more readily execute the colonel's orders.

Major of a Regiment of Horse, as well as foot, ought to be a man of honour, integrity, understanding, courage, activity, experience, and address: he should be master of arithmetic, and keep a detail of the regiment in every particular: he should be skilled in horsemanship, and ever attentive to his business: one of his principal functions is, to keep an exact roster of the officers for duty: he should have a perfect knowledge in all the military evolutions, as he is obliged by his post to instruct others, &c.

Town-Major, the third officer in order in a garrison, and next to the deputy-governor. He should understand fortification, and has a particular charge of the guards, rounds, patroles, and centinels.

Brigade-Major, is a particular officer appointed for that purpose only in camp: he goes every day to head-quarters to receive orders from the adjutant-general: there he writes exactly whatever is dictated to him: from thence he goes and gives the orders, at the place appointed for that purpose, to the different majors or

Major. adjutants of the regiments which compose that brigade, and regulates with them the number of officers and men which each are to furnish for the duty of the army; taking care to keep an exact roster, that one may not give more than another; and that each march in their tour: in short, the major of brigade is charged with the particular detail in his own brigade, in much the same way as the adjutant-general is charged with the general detail of the duty of the army. He sends every morning to the adjutant-general an exact return, by battalion and company, of the men of his brigade missing at the retreat, or a report expressing that none are absent: he also mentions the officers absent with or without leave.

As all orders pass through the hands of the majors of brigade, they have infinite occasions of making known their talents and exactness.

Major of Artillery, is also the next officer to the lieutenant-colonel. His post is very laborious, as the whole detail of the corps particularly rests with him; and for this reason all the non-commissioned officers are subordinate to him, as his title of *serjeant-major* imports: in this quality they must render him an exact account of every thing which comes to their knowledge, either regarding the duty or wants of the artillery and soldiers. He should possess a perfect knowledge of the power of artillery, together with all its evolutions. In the field he goes daily to receive orders from the brigade-major, and communicates them with the parole to his superiors, and then dictates them to the adjutant. He should be a very good mathematician, and be well acquainted with every thing belonging to the train of artillery, &c.

Major of Engineers, commonly with us called *Sub-director*, should be very well skilled in military architecture, fortification, gunnery, and mining. He should know how to fortify in the field, to attack and defend all sorts of posts, and to conduct the works in a siege, &c. See Engineer.

Aid-Major, is on sundry occasions appointed to act as major, who has a pre-eminence above others of the same denomination. Our horse and foot guards have their guidons, or second or third majors.

Serjeant-Major, is a non-commissioned officer of great merit and capacity, subordinate to the adjutant, as he is to the major. See Serjeant.

Drum-Major, is not only the first drummer in the regiment, but has the same authority over his drummers as the corporal has over his squad. He instructs them in their different beats; is daily at orders with the serjeants, to know the number of drummers for duty. He marches at their head when they beat in a body. In the day of battle, or at exercise, he must be very attentive to the orders given him, that he may regulate his beats according to the movements ordered.

Fife-Major, is he that plays the best on that instrument, and has the same authority over the fifers as the drum-major has over the drummers. He teaches them their duty, and appoints them for guards, &c.

Major, in *Law*, a person who is of age to manage his own affairs. By the civil law a man is not a major till the age of 25 years; in England, he is a major at 21, as in Normandy at 20.

Major, in *Logic*, is understood of the first proposition of a regular syllogism. It is called *major*, because it has a more extensive sense than the minor proposition, as containing the principal term. See Logic. Major.

Major and *Minor*, in *Music*, are applied to concords which differ from each other by a semi-tone. See Concord.

Major tone is the difference between the fifth and fourth; and major semi-tone the difference between the major fourth and the third. The major tone surpasses the minor by a comma.

Major-Domo, an Italian term frequently used to signify a steward or master of the household. The title of *major-domo* was formerly given in the courts of princes to three different kinds of officers. 1. To him who took care of what related to the prince's table, or eating; otherwise called *cleater*, *præfectus mensæ*, *architriclinus*, *dapifer*, and *princeps coquorum*.—2. Major-domo was also applied to the steward of the household.—3. The title of major-domo was also given to the chief minister, or him to whom the prince deputed the administration of his affairs, foreign and domestic, relating to war as well as peace. Instances of major-domos in the first two senses are frequent in the English, French, and Norman affairs.

Major, *John*, a scholastic divine and historian, was born at Haddington, in the province of East Lothian in Scotland. It appears from some passages in his writings, that he resided a while both at Oxford and Cambridge. He went to Paris in 1493, and studied in the college of St Barbe, under the famous John Boulac. Thence he removed to that of Montacute, where he began to study divinity under the celebrated Standouk. In the year 1498, he was entered of the college of Navarre. In 1505, he was created doctor in divinity; returned to Scotland in 1519, and taught theology during several years in the university of St Andrew's. But, at length, being disgusted with the quarrels of his countrymen, he went back to Paris, and resumed his lectures in the college of Montacute, where he had several pupils who afterwards became men of great eminence. About the year 1530, he returned once more to Scotland, and was chosen professor of theology at St Andrew's, of which he afterwards became provost; and there died in 1547, aged 78. His logical treatises form one immense folio; his commentary on Aristotle's physics makes another; and his theological works amount to several volumes of the same size. These masses of erude and useless disquisition were the admiration of his contemporaries. A work, less prized in his own age, was to make him known to posterity. His book *De Gestis Scotorum*, was first published at Paris by Badius Ascensius, in the year 1521. He rejects in it some of the fictions of former historians; and would have had greater merit if he had rejected more. He intermingles the history of England with that of Scotland; and has incurred the censure of some partial writers, for giving an authority to the authors of the former nation, which he refuses to those of his own. Bede, Caxton, and Froissard, were exceedingly useful to him. What does the greatest honour to this author is, the freedom with which he has censured the rapacity and indolence of ecclesiastics, and the strain of ridicule with which he treats the pope's supremacy. The style in which he wrote does not deserve commendation. Bishop Spottiswood calls it *Sorbonnic* and *barbarous*.

Majorca, Mairan.

MAJORCA, an island of the Mediterranean, lying between Yvica on the west and Minorca on the east. These three islands were anciently called *Baleares*, supposed to be from the skill of their inhabitants in slinging, for which they were very remarkable. Originally they belonged to the Carthaginians; but during the wars of that people with the Romans they seem to have regained their liberty. In 122 B. C. they were subdued by Metellus the Roman consul, who treated the inhabitants with such cruelty, that out of 30,000 he scarce left 1000 alive. He then built two cities on Majorca; one called *Palma*, now *Majorca*, to the east; the other to the west, named *Pollentia*, now no longer in being. The island continued subject to the Romans, and to the nations who overran the western part of the empire, for many ages. At last it was subdued by the Moors about the year 800. By them the island was put in a much better condition than it ever was before or since. The Moors being very industrious, and also populous, surrounded the whole coast with fortifications, that is, with a kind of towers and lines between them; cultivated every spot in the island that was not either rock or sand; and had no fewer than 15 great towns, whereas now there are not above three. Neither was it at all difficult for the Moorish monarch to bring into the field an army much superior in number to the inhabitants that are now upon it, taking in all ranks, sexes, and ages. In 1229, the island was subdued by the king of Arragon, who established in it a new kingdom, feudatory to that of Arragon, which was again destroyed in 1341 by the same monarchs; and ever since, the island hath been subject to Spain, and hath entirely lost its importance. It is about 60 miles long, and 45 broad. The air is clear and temperate; and, by its situation, the heat in summer is so qualified by the breezes, that it is by far the most pleasant of all the islands in the Mediterranean. There are some mountains; but the country is generally flat, and of such an excellent soil, that it produces great quantities of corn as good in its kind as any in Europe. Oil, wine, and salt, are very plentiful, as also black cattle and sheep; but deer, rabbits, and wildfowl, abound so much, that they alone are sufficient for the subsistence of the inhabitants. There are no rivers, but a great many springs and wells, as well as several good harbours. The inhabitants are robust, active, and good seamen.

MAJORCA, a handsome, large, rich, and strong town in the island of the same name, with a bishop's see. It contains about 6000 houses, and 22 churches, besides the cathedral. The squares, the cathedral, and the royal palace, are magnificent structures. A captain-general resides there, who commands the whole island; and there is a garrison against the incursion of the Moors. It was taken by the English in 1706; but was retaken in 1715, since which time it has been in the hands of the Spaniards. It is seated on the south-west part of the island, where there is a good harbour, 70 miles north-east of Yvica, 120 south-east of Barcelona, 140 east of Valencia, and 300 from Madrid. E. Long. 2. 55. N. Lat. 39. 36.

MAIRAN, JEAN JACQUES D'ORTOUS DE, descended from a noble family at Besiers, was born in that city in 1678, and died at Paris of a defluxion on the lungs on the 20th of February 1771, at the age of 93. He was one of the most illustrious members of the Academy of Sciences and of the French Academy. Being early connected with the former society, he, in the year 1741, succeeded Fontenelle in the office of secretary. This station he filled with the most distinguished success till the year 1744; and, like his predecessor, possessed the faculty of placing the most abstract subjects in the clearest light; a talent which is very rare, but which appears conspicuous in all his works. The chief of them are, 1. *Dissertation sur la Glace*, the last edition of which was printed in 1749, 12mo. This excellent little tract has been translated into German and Italian. 2. *Dissertation sur la cause de la lumiere des Phosphores*, 1717, 12mo. 3. *Traité historique et physique de l' Aurore Boreale*, first published in 12mo, 1733, and afterwards much enlarged and printed in 4to in 1754. The system embraced by the author is liable to be controverted; but the book displays great taste and erudition. 4. *Lettre au Pere Parennin, contenant diverses questions sur la Chine*, 12mo. This is a very curious work, and is full of that philosophical spirit which characterizes the author's other publications. 5. A great number of papers in the memoirs of the Academy of Sciences (since 1719), of which he published some volumes. 6. Several dissertations on particular subjects, which form only small pamphlets. 7. The *Eloges* of the Academicians of the Academy of Sciences, who died in 1741, 1742, 1743, in 12mo, 1747. Without imitating Fontenelle, the author attained almost equal excellence by his talent of discriminating characters, appreciating their worth, and giving them their due share of praise, without at the same time concealing their defects. Mairan.

Mairan's reputation extended itself into foreign countries. He was a member of the Imperial Academy at Petersburgh, of the Royal Academy of London, of the Institution at Bologna, of the Royal Societies of Edinburgh and Upsal, &c. The gentleness and sweetness of his manners made him be considered as a perfect model of the social virtues. He possessed that amiable politeness, that agreeable gaiety, and that steady firmness, which never fail to procure love and esteem. But we must add, says M. Saverien, that every thing had a reference to himself; self-love and a regard to his own reputation were the motives of all his actions. He was deeply affected with censure or applause, and yet he had many friends. Uniting much gentleness of disposition to an ingenious and agreeable expression of countenance, he possessed the art of insinuating himself into the good graces of others, so as to pave the way to elevation and success. He was honoured with protection and particular marks of regard by the duke of Orleans the regent, who bequeathed to him his watch in his will. The prince of Conti loaded him with favours; and the chancellor Daguesseau, observing in him great originality and ingenuity of thought, appointed him president of the *Journal des Sçavans*: a station which he filled very much to the satisfaction of the public and of the learned. The private and selfish views imputed to him by M. Saverien never made him deficient in what was due to the strictest probity. An expression of his is remembered, which could have proceeded only from sentiment; "An honest man (said he) is one whose blood is refreshed with the recital of a good action."

He

Mairan || Maistre.

He was ready at repartee. One day he happened to be in company with a gentleman of the gown, and to differ with him in opinion upon some point which had no more connexion with jurisprudence than with geometry. "Sir (said the magistrate, who supposed that a learned man was a perfect idiot out of his own sphere), we are not now talking of Euclid or Archimedes."—"No, nor of Cujas nor Barthole!" replied the academician.

MAIRE, STREIGHTS LE, a passage to Cape Horn, situated between Terra del Fuego and Staten island; which, being discovered by Le Maire, obtained his name. It is now, however, less made use of than formerly, ships going round Staten island at well as Terra del Fuego.

MAISTRE, LOUIS ISAAC LE, better known by the name of *Sacy*, was born at Paris in 1613. His genius very early discovered itself. After an excellent course of study under the direction of the abbot of Saint Cyran, he was raised to the priesthood in 1648, and soon after was chosen, on account of his virtues, to be director of the religious of Port Royal des Champs. As this monastery bore the reputation of Jansenism, their enemies were furnished with a pretence for persecuting them. In 1661 the director was obliged to conceal himself; and in 1666 he was committed to the Bastile. During his confinement he composed the book *Figures de la Bible;* in which, according to the Molinists, allusions are made to the sufferings endured by the Jansenists. If we may believe a Jesuit writer, the gentlemen of Port Royal and those who opposed their errors are represented in the 92d figure, the former by David, the latter by Saul. Rehoboam in the 116th figure, Jezebel in the 130th, Ahasuerus in the 148th and 150th, and Darius in the 160th, in the opinion of this author, represent Louis XIV. The writer of these anecdotes, of which we do not answer for the authenticity, adds, that when Sacy wished to reproach his persecutors, he always did it by means of the holy fathers. If this is the key to those enigmatical portraits and allusions, which it is pretended are to be found in that book, certain we are it was not discovered by the spirit of charity. Besides, it is not certain that Sacy was the author of that book; for it is much more probable that it was composed by Nicolas Fontaine his fellow prisoner.

To Sacy's confinement the public are indebted for a French translation of the Bible. This work was finished in 1668, the evening before the feast of All Saints; on which day he recovered his liberty, after an imprisonment of two years and a half. He was presented to the king and the minister; and all the favour he asked from them was, that they would send several times a year to examine the state of the prisoners in the Bastile. Le Maistre continued at Paris till 1675, when he retired to Port Royal, which he was obliged to leave in 1679. He went to settle at Pompone, where he died January 4. 1684, at the age of 71. From him we have, 1. *La Traduction de la Bible*, with explanations of the spiritual and literal meaning taken from the fathers, the greater part of which was done by Du Fossé, Huré, and Tourneux. This is the best French translation which has yet appeared, and the most esteemed edition is that of Paris in 32 volumes 8vo, 1682 and following years. The author translated the New Testament three times, because the first time the style of it appeared too much laboured and too refined, and the second too simple. A counterfeit of the edition in 32 vols. 8vo, was published at Brussels in 40 vols. 12mo. The best editions of this version have been published at Brussels, 1700, in 3 vols. 4to; at Amsterdam, under the name of *Paris*, 1711, 8 vols. 12mo; at Paris 1713, in 2 vols. 4to; and in 1715, with notes and a concordance, 4 vols. folio. 2. *Une Traduction des Pseaumes selon l'Hebreu et la Vulgate*, in 12mo. 3. *Une version des Homelies de St Chrysostome sur St Matthieu*, in 3 vols. 8vo. 4. *La Traduction de l'Imitation de Jesus Christ* (*sous le nom de Beuil, prieur de Saint-Val*), Paris 1663, 8vo. 5. *Celle de Phedre*, 12mo, (*sous le nom de Saint-Aubin*). 6. *De trois Comédies de Térence*, in 12mo. 7. *Des Lettres de Bongars* (*sous le nom de Brianville*). 8. *Du Poëme de St Prosper sur les ingrates*, 12mo, *en verse et en prose*. 9. *Les Enluminures de l'Almanach des Jésuites*, 1654, 12mo, reprinted in 1733. In 1653 there appeared a print representing the overthrow of Jansenism anathematized by the two powers, and the confusion of the disciples of the bishop of Ypres, who are going to seek refuge with the Calvinists. The monks of Port-Royal were greatly provoked at this print, and Sacy thought that he would lower its reputation by means of his *Enluminures*, which Racine has ridiculed in one of his letters. It is indeed very strange that men of taste and piety should write satires to the injury of one another. 10. *Heures de Port-Royal*, 12mo. 11. *Lettres de Piété*, Paris 1690, 2 vols. 8vo.

Maistre, Maittaire.

MAITTAIRE, MICHAEL, a learned English writer, was born in 1668. Dr South, canon of Christ-Church, made him a student of that house, where he took the degree of M. A. March 23. 1696. From 1695 till 1699 he was second master of Westminster school; which was afterwards indebted to him for *Græcæ Linguæ Dialecti, in usum Scholæ Westmonasteriensis*, 1706, 8vo; and for the "English Grammar, applied, to, and exemplified in, the English Tongue, 1712," 8vo. In 1711, he published "Remarks on Mr Whiston's Account of the Convocation's proceedings with relation to himself, in a Letter to the right reverend Father in God George Lord Bishop of Bath and Wells," 8vo; also "An Essay against Arianism, and some other Heresies; or a Reply to Mr William Whiston's Historical Preface and Appendix to his Primitive Christianity revived," 8vo. In 1709 he gave the first specimen of his great skill in typographical antiquities, by publishing *Stephanorum Historia, vitas ipsorum ac libros complectens*, 8vo; which was followed in 1717 by *Historia Typographorum aliquot Parisiensium, vitas et libros complectens*, 8vo. In 1719, *Annales Typographici ab artis inventæ origine ad annum* MD, 4to. The second volume, divided into two parts, and continued to the year 1536, was published at the Hague in 1702; introduced by a letter of John Toland, under the title of *Conjectura verisimilis de prima Typographiæ Inventione*. The third volume, from the same press, in two parts, continued to 1557, and (by an Appendix) to 1664, in 1725. In 1733 was published at Amsterdam what is usually considered as the fourth volume, under the title of *Annales Typographici ab artis inventæ origine, ad annum* MDCLXIV, *opera Mich. Maittaire, A. M. editio nova, auctior et emendatior; tomi*

Maittaire. *tomi primi pars posterior* (A). In 1741 the work was closed at London, by *Annalium Typographicorum Tomus quintus et ultimus, indicem in tomos quatuor præcuntes complectens;* divided, like the two preceding volumes, into two parts. In the intermediate years, Mr Maittaire was diligently employed on various works of value. In 1713 he published by subscription *Opera et Fragmenta Veterum Poëtarum*, 1713, two volumes in folio: the title of some copies is dated 1721. In 1714, he was the editor of a Greek Testament, in 2 vols. The Latin writers, which he published separately, most of them with good indexes, came out in the following order: In 1713, *Christus Patiens; Justin; Lucretius; Phædrus; Sallust; Terence.* In 1715, *Catullus; Tibullus; Propertius; Cornelius Nepos; Florus; Horace; Juvenal; Ovid*, 3 vols; *Virgil.* In 1711, *Cæsar's Commentaries; Martial; Quintus Curtius.* In 1718 *and* 1725, *Velleius Paterculus.* In 1719, *Lucan.* In 1720, *Bonefonii Carmina.* In 1721, he published, *Batrachomyomachia, Græcè, ad veterum exemplarium fidem recusa; glossa Græca, variantibus lectionibus, versionibus Latinis, commentariis et indicibus, illustrata*, 8vo. In 1722, *Miscellanea Græcorum aliquot Scriptorum Carmina, cum versione Latina et notis*, 4to. In 1724 he compiled, at the request of Dr John Freind (at whose expence it was printed), an index to the works of *Arctæus*, to accompany the splendid folio edition of that author in 1723. In 1725 he published an excellent edition of *Anacreon* in 4to, of which no more than 100 copies were printed, and the few errata in each copy corrected by his own hand. A second edition of the like number was printed in 1741, with six copies on fine writing paper. In 1726 he published *Petri Petiti Medici Parisiensis in tres priores Arctæi Cappadocis Libros Commentarii, nunc primum editi*, 4to. This learned commentary was found among the papers of Grævius. From 1728 to 1733 he was employed in publishing *Marmorum Arundelianorum, Seldenianorum, aliorumque Academiæ Oxoniensi donatorum, una cum Commentariis et Indice, editio secunda*, folio; to which an Appendix was printed in 1733. *Epistola D. Mich. Maittaire ad D. P. Des Maizeaux, in qua Indices in Annales Typographicos methodus explicatur*, &c. printed in "The Present State of the Republic of Letters," August 1733, p. 142. The life of Robert Stephens in Latin, revised and corrected by the author, with a new and complete list of his works, is prefixed to the improved edition of R. Stephens's Thesaurus, 4 vols. in folio, in 1734. In 1736 appeared *Antiquæ Inscriptiones duæ*, folio; being a commentary on two large copper tables discovered near Heraclea, in the bay of Tarentum. In 1738 were printed at the Hague *Græcæ Linguæ Dialecti in Scholæ Regiæ Westmonasteriensis usum recognitæ, opera Mich. Maittaire.* In 1739 he addressed to the empress of Russia a small Latin poem, under the title of *Carmen Epicinium Augustissimæ Russorum Imperatrici sacrum.* His name not having been printed in the title page, it is not so generally known that he was editor of Plutarch's *Apophthegmata*, 1641, 4to. The last publication of Mr Maittaire was a volume of poems in 4to, 1742, under the title of *Senilia, sive Poetica aliquot in argumentis varii generis tentamina.* Mr Maittaire died in 1747, aged 79. His valuable library, which had been 50 years collecting, was sold by auction by Messrs Cock and Langford, at the close of the same year, and the beginning of the following, taking up in all 44 nights. Mr Maittaire, it may be added, was patronized by the first earl of Oxford, both before and after that gentleman's elevation to the peerage, and continued a favourite with his son the second earl. He was also Latin tutor to Mr Stanhope, the earl of Chesterfield's favourite son. Maittaire || Malacca.

MAIZE, or *Indian Corn.* See Zea, Botany *Index.*

MAKI. See Lemur, Mammalia *Index.*

MALABAR, the name given to a great part of the west coast of the peninsula of Hindostan on this side of the Ganges, extending from the kingdom of Baglala to Cape Comorin, or from the north extremity of the kingdom of Canara as far as Cape Comorin, and lying between 9° and 14° N. Lat. It is bounded by the mountains of Balagate on the east; by Deccan on the north; and on the west and south is washed by the Indian sea.

MALACA, in *Ancient Geography*, surnamed *Fœderatorum* by Pliny; a maritime town of Bætica; a Carthaginian colony according to Strabo; so called from *Malach*, signifying "salt;" a place noted for pickled or salted meat. Now *Malaga*, a port town of Granada in Spain. W. Long. 4. 45. N. Lat. 36. 40.

MALACCA, the most southerly part of the great peninsula beyond the Ganges, is about 600 miles in length, and contains a kingdom of the same name. It is bounded by the kingdom of Siam on the north; by the bay of Siam and the Indian ocean on the east; and by the straits of Malacca, which separate it from the island of Sumatra, on the south-west. This country is more to the south than any other in the East Indies; and comprehends the towns and kingdoms of Patan, Pahan, Igohor, Pera, Queda, Borkelon, Ligor; and to the north the town and kingdom of Tanassery, where the Portuguese formerly carried on a great trade. This last either does or did belong to the king of Siam. The people of Malacca are in general subject to the Dutch, who possess all the strong places on the coast, and compel them to trade on their own terms, excluding all other nations of Europe from having any commerce with the natives.

The Malays are governed by feudal laws. A chief, who has the title of *king* or *sultan*, issues his commands to his great vassals, who have other vassals in subjection to them in a similar manner. A small part of the nation live independent, under the title of *orancai* or *noble*,

(A) The awkwardness of this title has induced many collectors to dispose of their first volume, as thinking it superseded by the second edition: but this is by no means the case; the volume of 1719 being equally necessary to complete the set as that of 1733, which is a revision of all the former volumes. The whole work, when properly bound, consists, *ad libitum*, either of five volumes or of nine.

Malacca. *ble*, and sell their services to those who pay them best; while the body of the nation is composed of slaves, and live in perpetual servitude.

The generality of these people are restless, fond of navigation, war, plunder, emigration, colonies, desperate enterprises, adventures, and gallantry. They talk incessantly of their honour and their bravery; whilst they are universally considered by those with whom they have intercourse, as the most treacherous, ferocious people on earth. This ferocity, which the Malays qualify under the name of *courage*, is so well known to the European companies who have settlements in the Indies, that they have universally agreed in prohibiting the captains of their ships who may put into the Malay islands, from taking on board any seamen from that nation, except in the greatest distress, and then on no account to exceed two or three. It is not in the least uncommon for a handful of these horrid savages suddenly to embark, attack a vessel by surprise, massacre the people, and make themselves masters of her. Malay batteaux, with 24 or 30 men, have been known to board European ships of 30 or 40 guns, in order to take possession of them, and murder with their poniards great part of the crew. Those who are not slaves go always armed: they would think themselves disgraced if they went abroad without their poniards, which they call *crit*. As their lives are a perpetual round of agitation and tumult, they cannot endure the long flowing garments in use among the other Asiatics. Their habits are exactly adapted to their shapes, and loaded with a multitude of buttons, which fasten them close to their bodies.

The country possessed by the Malays is in general very fertile. It abounds with odoriferous woods, such as the aloes, the sandal, and cassia. The ground is covered with flowers of the greatest fragrance, of which there is a perpetual succession throughout the year. There are abundance of mines of the most precious metals, said to be richer even than those of Brazil or Peru, and in some places are mines of diamonds. The sea also abounds with excellent fish, together with ambergrise, pearls, and those delicate bird-nests so much in request in China, formed in the rocks with the spawn of fishes and the foam of the sea, by a species of small-sized swallow peculiar to those seas. These are of such an exquisite flavour, that the Chinese for a long time purchased them for their weight in gold, and still buy them at an excessive price. See *Birds-Nest*.

Notwithstanding all this plenty, however, the Malays are miserable. The culture of the lands, abandoned to slaves, is fallen into contempt. These wretched labourers, dragged incessantly from their rustic employments by their restless masters, who delight in war and maritime enterprises, have never time or resolution to give the necessary attention to the labouring of their grounds; of consequence the lands for the most part are uncultivated, and produce no kind of grain for the subsistence of the inhabitants. The sago tree indeed supplies in part the defect of grain. It is a species of the palm tree, which grows naturally in the woods to the height of about 20 or 30 feet; its circumference being sometimes from five to six. Its ligneous bark is about an inch in thickness, and covers a multitude of long fibres, which being interwoven one with another envelope a mass of a gummy kind of meal. As soon as this tree is ripe, a whitish dust, which transpires through the pores of the leaves, and adheres to their extremities, indicates that the trees are in a state of maturity. The Malays then cut them down near the root, and divide them into several sections, which they split into quarters: they then scoop out the mass of mealy substance, which is enveloped by and adheres to the fibres; they dilute it in pure water, and then pass it through a straining bag of fine cloth, in order to separate it from the fibres. When this paste has lost part of its moisture by evaporation, the Malays throw it into a kind of earthen vessel of different shapes, where they allow it to dry and harden. This paste is wholesome nourishing food, and preserves for many years. Malacca || Malaga.

Malacca, the capital of the country of the same name, is situated in a flat country close to the sea. The walls and fortifications are founded on a solid rock, and are carried up to a great height; the lower part of them is washed by the sea at every tide, and on the land side is a wide canal or ditch, cut from the sea to the river, which makes it an inland. In 1641 it was taken from the Portuguese by the Dutch, from which time it continued in their possession till 1795, when it was taken by the British. It was restored at the peace of Amiens, retaken in 1807 by the British, but appears to have been included in the cessions made to the Dutch by the treaty of 13th August 1814. The houses are tolerably well built, and some of them have gardens behind or on one side. The inhabitants consist of a few Dutch, many Malayans, Moors, Chinese, and other Indians. The city is well situated for navigation; but the trade of the place is trifling. E. Long. 102. 2. N. Lat. 2. 12.

MALACHI, or the prophecy of Malachi, a canonical book of the Old Testament, and the last of the 12 lesser prophets. Malachi prophesied about 300 years before Christ, reproving the Jews for their wickedness after their return from Babylon, charging them with rebellion, sacrilege, adultery, profaneness, and infidelity; and condemning the priests for being scandalously careless in their ministry; at the same time not forgetting to encourage the pious few, who, in that corrupt age, maintained their integrity. This prophet distinctly points at the Messiah, who was suddenly to come to his temple, and to be introduced by Elijah the prophet, that is, John the Baptist, who came in the spirit and power of Elias or Elijah.

MALACIA, in *Medicine*, is a languishing disorder incident to pregnant women, in which they long sometimes for one kind of food and sometimes for another, and eat it with extraordinary greediness.

MALACOPTERYGEOUS, in *Ichthyology*, an appellation given to fishes having the rays of their fins bony at the extremities, but not pointed, like those of acanthopterygeous fishes.

MALACOSTOMOUS fishes, those destitute of teeth in the jaws, called in English *leather-mouthed*, as the tench, carp, bream, &c.

MALAGA, an ancient, rich, and strong town of Spain, in the kingdom of Granada, with two castles, a bishop's see, and a good harbour, which renders it a place of considerable commerce. The advantage

of

Malaga, Malagrida.

of this commerce, according to M. Bourgoanne, is entirely in favour of Spain, but almost without any to its navigation; of 842 vessels which arrived at this port in 1782, from almost every commercial nation, scarcely 100 were Spanish, even reckoning the ships of war which anchored there. The English, who are in possession of the greatest part of the trade, carry thither woollens and great quantities of small ware; the Dutch carry spice, cutlery ware, laces, ribbons, thread, &c. These nations, those of the north, and Italy, export to the amount of two millions and a half of piastres in wines, fruits, sumach, pickled anchovies, oil, &c. and all they carry thither amounts only to about a million and a half. The balance would be still more advantageous for Malaga if the silk and wool of Granada were exported from this port; but these are employed in the country where they are produced. Sugar has been cultivated in the vicinity of this town for 700 years. The streets of Malaga are narrow, but there are some good squares; and the cathedral church is a superb building, said to be as large as St Paul's. The bishop's palace is a large edifice, but looks insignificant from its being situated near the other. Its prelate enjoys a revenue of 16,000l. sterling. Malaga is seated on the Mediterranean sea, at the foot of a craggy mountain. W. Long. 4. 10. N. Lat. 36. 51.

MALAGRIDA, GABRIEL, an Italian Jesuit, was chosen by the general of the order to conduct missions into Portugal. To great ease and fluency of speech, for which he was indebted to enthusiasm, he added the most ardent zeal for the interest of the society to which he belonged. He soon became the fashionable director; and every one, small or great, placed himself under his conduct. He was respected as a saint, and consulted as an oracle. When a conspiracy was formed by the duke d'Aveiro against the king of Portugal, it is asserted by the enemies of the society, that three Jesuits, among whom was Malagrida, were consulted concerning the measure. They add (what is very improbable), that it was decided by these casuists, that it was only a venial crime to kill a king who persecuted the saints. At that time the king of Portugal, spurred on by a minister who had no favour for the Jesuits, openly declared himself against them, and soon after banished them from his kingdom. Only three of them were apprehended, Malagrida, Alexander, and Mathos, who were accused of having approved this murder. But either the trial could not be proceeded in without the consent of the pope, which was not granted, or no proof could be got sufficient to condemn Malagrida; and therefore the king was obliged to deliver him to the Inquisition, as being suspected of having formerly advanced some rash propositions which bordered on heresy. Two publications which he acknowledged, and which give the fullest indications of complete insanity, were the foundation of these suspicions. The one was written in Latin, and entitled *Tractatus de vita et imperio Antichristi;* the other in Portuguese, under the title of the "Life of St Anne, composed with the assistance of the blessed Virgin Mary and her most holy Son." They are full of extravagance and absurdity.—This enthusiast pretended to have the gift of miracles. He confessed before the judges of the Inquisition, that God himself had declared him his ambassador, apostle, and prophet; that he was united to God by a perpetual union; and that the Virgin Mary, with the consent of Jesus Christ and of the whole Trinity, had declared him to be her son. In short, he confessed, as is pretended, that he felt in the prison, at the age of 72, some emotions very uncommon at that period of life, which at first gave him great uneasiness, but that it had been revealed to him by God that these emotions were only the natural effect of an involuntary agitation, wherein there was the same merit as in prayer. It was for such extravagancies, that this unfortunate wretch was condemned by the Inquisition; but his death was hastened by a vision which he eagerly revealed. Upon occasion of the death of the marquis de Tancourt, commander in chief of the province of Estremadura, mournful and continued discharges were made in honour of him by the castle of Lisbon, and by all the forts on the banks of the Tagus. These being heard by Malagrida in his dungeon, he instantly supposed, from their extraordinary nature, and from their happening during the night, that the king was dead. The next day he demanded an audience from the members of the Inquisition: which being granted, he told them that he had been ordered by God to show the minister of the holy office that he was not a hypocrite, as was pretended; for the king's death had been revealed to him, and he had seen in a vision the torments to which his majesty was condemned for having persecuted the religious of his order. This was sufficient to accelerate his punishment: he was burnt on the 21st of September 1761; not as the accomplice of a parricide, but as a false prophet, for which he deserved to be confined in bedlam rather than tied to the stake. The acts of impiety whereof he was accused were nothing more than extravagancies proceeding from a mistaken devotion and an overheated brain.

Malagrida || Maldivia.

MALDEN, a town of Essex, 37 miles from London, situated on an eminence at the conflux of the Chalmer and Pant or Blackwater, where they enter the sea. It was the first Roman colony in Britain, and the seat of some of the old British kings. It was besieged, plundered, and burnt by Queen Boadicea: but the Romans repaired it. It was again ruined by the Danes, but rebuilt by the Saxons. It has a convenient haven on an arm of the sea for vessels of 400 tons; and a considerable trade in coals, iron, corn, and deals. A little beyond it begins Blackwater bay, famous for the Walfleet oysters. The channel called Malden water is navigable to the town. King Edward the elder (of the Saxon race) resided here whilst he built Witham and Hertford castles. On the west side of the town are the remains of a camp. The population in 1811 was 2679.

MALALEUCA, the CAYPUTI TREE, a genus of plants belonging to the polyadelphia class. See BOTANY *Index*. This plant, which is a native of the Moluccas, yields the oil called *Cayputi*.

MALDIVIA ISLANDS, a cluster of small islands in the Indian ocean, 500 miles south-west of the continent of the island of Ceylon. They are about 1000 in number, and are very small; extending from the second degree of south latitude to the seventh degree of north latitude. They are generally black low lands, surrounded by rocks and sands. The natives are of the same complexion with the Arabians, profess the

Maldivia || Malebranche.

Mahometan religion, and are subject to one sovereign. The channels between the islands are very narrow, and some of them are fordable. They produce neither rice, corn, nor herbage; but the natives live upon cocoanuts, and other fruits, roots, and fish. They carry on a little trade with the British Indian settlements, exchanging their salt-fish, turtle-shells, and cocoa, for rice, sugar, hardware, cloth, &c. They have also a considerable trade among themselves. Their manners are mild and inoffensive.

MALE, among zoologists, that sex of animals which has the parts of generation situated externally. See SEX and GENERATION.

The term *male* has also from some similitude to that sex in animals, been applied to several inanimate things; thus we say, a male flower, a male screw, &c. See MAS *Planta*, MASCULUS *Flos*, and SCREW; also FEMALE and FLOS.

MALEBRANCHE, NICHOLAS, an eminent French metaphysician, the son of Nicholas Malebranche, secretary to the French king, was born in 1638, and admitted into the congregation of the oratory in 1660. He at first applied himself to the study of languages and history: but afterwards meeting with Des Cartes's *Treatise of Man*, he gave himself up entirely to the study of philosophy. In 1699, he was admitted an honorary member of the Royal Academy of Sciences at Paris. Notwithstanding he was of a delicate constitution, he enjoyed a pretty good state of health till his death, which happened in 1715, at the age of 77. Father Malebranche read little, but thought a great deal. He despised that kind of philosophy which consists only in knowing the opinions of other men, since a person may know the history of other men's thoughts without thinking himself. He could never read ten verses together without disgust. He meditated with his windows shut, in order to keep out the light, which he found to be a disturbance to him. His conversation turned upon the same subjects as his books; but was mixed with so much modesty and deference to the judgment of others, that it was extremely and universally desired. His books are famous; particularly his *Recherche de la Verité*, i. e. "Search after truth:" his design in which is, to point to us the errors into which we are daily led by our senses, imagination, and passions; and to prescribe a method for discovering the truth, which he does, by starting the notion of seeing all things in God. And hence he is led to think and speak meanly of human knowledge, either as it lies in written books, or in the book of nature, compared with that light which displays itself from the ideal world; and, by attending to which, with pure and defecate minds, he supposes knowledge to be most easily had. The fineness of this author's sentiments, together with his fine manner of expressing them, made every body admire his genius and abilities; but he has generally passed for a visionary philosopher. Mr Locke, in his examination of Malebranche's opinion of seeing all things in God, styles him, "an acute and ingenious author;" and tells us, that there are "a great many very fine thoughts, judicious reasonings, and uncommon reflections in his *Recherches*." But Mr Locke, in that piece, endeavours to refute the chief principles of his system. He wrote many other pieces besides that we have mentioned, all tending to confirm his main system, established in the *Recherche*, and to clear it from the objections which were brought against it, or from the consequences which were deduced from it; and if he has not attained what he aimed at in these several productions, he has certainly shown great abilities and a vast force of genius. See SUPPLEMENT, FIRST DISSERTATION, p. 113.

Malebranche, Malesherbes.

MALESHERBES, CHRISTIAN-WILLIAM DE LAMOIGNON DE, was born at Paris in 1721. He was son of the chancellor of France, William de Lamoignon, who was descended of an illustrious family. His early education he received at the Jesuits college, applying himself afterwards to the study of the law with great assiduity, as well as history and political economy. He was chosen a counsellor of the parliament of Paris at the age of 24, and succeeded his father as president of the court of aids in the year 1750. With the presidentship of the court of aids he received the superintendance of the press, in whose hands it became the means of promoting liberty to a degree beyond all former example in that country. As he firmly believed that despotism alone had any reason to dread the liberty of the press, he was anxious to give it every extension consistent with sound policy and the state of public opinion. Through his favour the French Encyclopædia, the works of Rousseau, and many other free speculations, issued from the press, in defiance of the terrific anathemas of the Sorbonne. This had its own weight in paving the way to the horrors of the revolution, which Malesherbes did not probably foresee; yet it had also the happy effect of freeing the minds of men from the fetters of ignorance and superstition, and of enlightening them respecting their rights and duties in society.

The superintendance of the press having been taken from him, to confer it on that tool of despotism Maupeou, he was only the more intent on fulfilling the duties of his presidentship, and opposing arbitrary power with all his vigour, being thus freed from a number of other cares. When the proceedings of the court of aids were to be prohibited, on account of the spirited conduct of Malesherbes in the case of one Monnerat, who had been most unjustly treated by the farmers of the revenue, he presented a remonstrance to the king, containing a free protest against the enormous abuses of lettres de cachet, by which every man's liberty was rendered precarious, concluding with these memorable words; "no one is great enough to be secure from the hatred of a minister, nor little enough not to merit that of a clerk." Soon after this he was banished to his country-seat by a lettre de cachet, and the duke de Richelieu at the head of an armed force abolished the tribunal. In this state of retirement he committed to paper a number of observations on the political and judicial state of France, on agriculture and natural history, which all perished in the wreck of the revolution.

On the accession of Louis XVI. to the throne in 1774, he received an order to appear at the place where the court of aids had sat, and resume the presidentship of the tribunal thus restored. He laid before the new sovereign an ample memoir on the calamitous state of the kingdom, with a free exposure of the faults by which it had been produced, from a firm conviction that truth at all times should have access to the throne. His sentiments so fully accorded with those of the

Malesherbes.

the young king, whose mind was not yet corrupted, that he was chosen minister of state in the year 1775, in which elevated rank he was only ambitious to extend the sphere of his usefulness. His first care was to visit the prisons, and restore to liberty the innocent victims of the former reign. His administration was also distinguished by the powerful encouragement of commerce and agriculture, being supported in his laudable endeavours by the able and virtuous Turgot, at that time comptroller-general of the revenue, who having lost his place through the intrigues of financiers, Malesherbes did not long retain his office after him. As he failed in his benevolent endeavours to ameliorate the condition of Protestants respecting the solemnization of marriage and the legitimating of their children, he resigned his office in the month of May 1776.

Being fond of travelling, and resolved to mix freely with people of every description, in order to acquire an accurate knowledge of human nature, he assumed the humble title of M. Guillaume, and commenced his journey in a simple, frugal manner. He travelled through France, Switzerland and Holland, frequently on foot, and lodged in villages, to have a nearer survey of the state of the country. He made memorandums, with the greatest care, of whatever he conceived to be worthy of observation respecting the productions of nature and the operations of industry; and after an absence of some years he returned to his favourite mansion, fully fraught with such a stock of valuable knowledge as his age and experience qualified him to appreciate.

Finding on his return that his native country was far advanced in philosophical principles, he drew up two elaborate memoirs to the king, one of them on the condition of the Protestants, and the other on civil liberty and toleration in general; and the difficulties with which ministers now found themselves surrounded, induced the king to call him to his councils, being a man who stood high in the esteem of the whole nation, but he received no appointment to any particular office. In the critical state in which he clearly saw the king stood, he made one effort for opening his eyes, by means of two spirited and energetic memoirs, "On the calamities of France, and the means of repairing them;" but, as the queen's party carried every thing before it, he was not even permitted to read them, and also denied a private interview with the ill-fated monarch, in consequence of which he took his final leave of the court.

When by a decree of the national convention the unfortunate Louis was to be tried for his life, Malesherbes generously offered to plead his cause, nobly forgetting the manner in which he had been banished from his councils. He was the person who announced to him his cruel doom, and one of the last who took leave of him, when taken out to suffer. After this eventful period, he withdrew to his retreat with a deeply wounded heart, and refused to hear any thing more of what was acting on the bloody theatre of Paris. Walking one morning in his garden, he perceived four men coming towards his house, sent by the convention to arrest his daughter Mad. Lepelletier Rossambo and her husband, once president of the parliament of Paris; and the accusation of Malesherbes was followed, as a matter of course, by the sentence of death. The truth is, the convention never forgave his defence of the king; an action, however, in which he himself always gloried.

Malesherbes || Malice.

On the fatal day, this great man left the prison with a serene countenance; and, happening to stumble against a stone, he said (with the pleasantry of Sir Thomas More), "a Roman would have thought this an unlucky omen, and walked back again." He conversed with his children in the cart, took an affectionate farewell, and received the stroke in April 1794, in the 73d year of his age. Thus fell, by the insatiable cruelty of a monster, whose hatred to men of virtue and abilities was implacable, one of the most spotless and exemplary characters of the period at which he lived. The government afterwards made some reparation for the injustice done him, by ordering his bust to be placed among those of the great men who have reflected honour upon their country.

MALHERBE, Francis de, the best French poet of his time, was born at Caen about the year 1556, of a noble and ancient family. He quitted Normandy at 17 years of age; and went into Provence, where he attached himself to the family of Henry Angouleme, the natural son of King Henry II. and was in the service of that prince till he was killed by Altoviti in 1586. At length Cardinal de Perron, being informed of his merit and abilities, introduced him to Henry IV. who took him into his service. After that monarch's death, Queen Mary de Medicis settled a pension of 500 crowns upon our poet, who died at Paris in 1628. The best and most complete edition of his poetical works is that of 1666, with Menage's remarks. Malherbe so far excelled all the French poets who preceded him, that Boileau considers him as the father of French poetry: but he composed with great difficulty, and put his mind on the rack in correcting what he wrote. He was a man of singular humour, and blunt in his behaviour. When the poor used to promise him, that they would pray to God for him, he answered them, that "he did not believe they could have any great interest in heaven, since they were left in such a bad condition upon earth; and that he should be better pleased if the duke de Luyne, or some other favourite, had made him the same promise." He would often say that "the religion of gentlemen was that of their prince." During his last sickness he had much ado to resolve to confess to a priest: for which he gave this facetious reason, that "he never used to confess but at Easter." And some few moments before his death, when he had been in a lethargy two hours, he awaked on a sudden to reprove his landlady, who waited on him, for using a word that was not good French; saying to his confessor, who reprimanded him for it, that "he could not help it, and he would defend the purity of the French language to the last moment of his life."

MALICE, in *Ethics* and *Law*, is a formed design of doing mischief to another; it differs from hatred. In murder, it is malice makes the crime; and if a man, having a malicious intent to kill another, in the execution of his malice kills a person not intended, the malice shall be connected to his person, and he shall be adjudged a murderer. The words or *malitia præcogitata* are necessary to an indictment of murder, &c. And this *malitia præcogitata*, or *malice prepense*,

Malice
||
Mallet.

may be either express or implied in law. Express malice is, when one, with a sedate, deliberate mind, and formed design, kills another; which formed design is evidenced by external circumstances discovering that intention; as lying in wait, antecedent menaces, formed grudges, and concerted schemes to do him some bodily harm. Besides, where no malice is expressed, the law will imply it; as where a man wilfully poisons another, in such a deliberate act the law presumes malice, though no particular enmity can be proved. And if a man kills another suddenly, without any, or without a considerable provocation, the law implies malice; for no person, unless of an abandoned heart, would be guilty of such an act upon a slight or no apparent cause.

MALIGNANT, among physicians, a term applied to diseases of a very dangerous nature, and generally infectious; such are the dysentery, hospital fever, &c. in their worst stages.

Malignity among physicians signifies much the same with contagion. See CONTAGION.

MALL, SEA-MALL, or *Sea-mew*. See LARUS, ORNITHOLOGY *Index*.

MALLARD. See ANAS, ORNITHOLOGY *Index*.

MALLEABLE, a property of metals, whereby they are capable of being extended under the hammer.

MALLENDERS. See FARRIERY *Index*.

MALLEOLI, in the ancient art of war, were bundles of combustible materials, set on fire to give light in the night, or to annoy the enemy: when they were employed for the latter purpose they were shot out of a bow, or fixed to a javelin, and thus thrown into the enemies engines, ships, &c. in order to burn them. Pitch was always a principal ingredient in the composition. The malleoli had also the name of *pyroboli*.

MALLET, or MALLOCH, *David*, an English poet, but a Scotsman by birth, was born in that country about 1700. By the penury of his parents, he was compelled to be janitor of the high school at Edinburgh; but he surmounted the disadvantages of his birth and fortune; for when the duke of Montrose applied to the college of Edinburgh for a tutor to educate his sons, Malloch was recommended. When his pupils went abroad, they were intrusted to his care; and having conducted them through their travels, he returned with them to London. Here, residing in their family, he naturally gained admission to persons of high rank and character. His first production was the popular and pathetic ballad of "William and Margaret," which was printed in the Plain Dealer, N° 36. 1724. In the last edition of his works it appears considerably altered. In 1733, he published a poem on verbal Criticism, on purpose to make his court to Pope. In 1740, he wrote a Life of Lord Bacon, which was then prefixed to an edition of his works; but with so much more knowledge of history than of science, that, when he afterwards undertook the Life of Marlborough, some were apprehensive lest he should forget that Marlborough was a general, as he had forgotten that Bacon was a philosopher. The old duchess of Marlborough assigned in her will this task to Glover and Mallet, with a reward of 1000l. and a prohibition to insert any verses. Glover is supposed to have rejected the legacy with disdain, so that the work devolved upon Mallet; who had also a pension from the duke of Marlborough to promote his industry, and who was continually talking of the discoveries he made, but left not when he died any historical labours behind. When the prince of Wales was driven from the palace, and kept a separate court by way of opposition, to increase his popularity by patronizing literature, he made Mallet his under secretary, with a salary of 200l. a-year.—Thomson likewise had a pension; and they were associated in the composition of the Masque of Alfred, which, in its original state, was played at Cliefden in 1740. It was afterwards almost wholly changed by Mallet, and brought upon the stage of Drury Lane in 1751, but with no great success. He had before published two tragedies; Eurydice, acted at Drury Lane in 1731; and Mustapha, acted at the same theatre in 1739. It was dedicated to the prince his master, and was well received, but never was revived. His next work was Amyntor and Theodora (1747), a long story in blank verse; in which there is a copiousness and elegance of language, vigour of sentiment, and imagery well adapted to take possession of the fancy. In 1753, his masque of Britannia was acted at Drury Lane; and his tragedy of Elvira in 1763; in which year he was appointed keeper of the book of entries for ships in the port of London. In the beginning of the war, which ended in 1763, when the nation was exasperated by ill success, he was employed to turn the public vengeance upon Byng, and wrote a letter of accusation under the character of a Plain Man. The paper was with great industry circulated and dispersed; and for his seasonable intervention he had a considerable pension bestowed upon him, which he retained to his death. Towards the end of his life he went with his wife to France; but after a while, finding his health declining, he returned alone to England, and died in April 1765. He was twice married, and by his first wife had several children. One daughter, who married an Italian of rank named Cilesia, wrote a tragedy called Almida, which was acted at Drury Lane. His stature was diminutive, but, he was regularly formed; his appearance, till he grew corpulent, was agreeable, and he suffered it to want no recommendation that dress could give it. His conversation was elegant and easy.

Mallet.

MALLET, *Edme*, was born at Melun in 1713, and enjoyed a curacy in the neighbourhood of his native place till 1751, when he went to Paris to be professor of theology in the college of Navarre, of which he was admitted a doctor. Boyer, bishop of Mirepoix, was at first much prejudiced against him; but being afterwards undeceived, he conferred upon him the see of Verdun as a reward for his doctrine and morals. Jansenism had been imputed to him by his enemies with his prelate; and the gazette which went by the name of *Ecclesiastical*, accused him of impiety. Either of these imputations was equally undeserved by the abbé Mallet: as a Christian, he was grieved at the disputes of the French church; and as a philosopher, he was astonished that the government had not, from the very beginning of those dissensions imposed silence on both parties. He died at Paris in 1755, at the age of 42. The principal of his works are, 1. *Principes pour la lecture des Poëtes*, 1745, 12mo, 2 vols. 2. *Essai sur l'Etude des Belles Lettres*, 1747, 12mo.

Mallet, Mallicollo.

12mo. 3. *Essai sur les bienseance oratoires*, 1753, 12mo. 4. *Principes pour la lectures des Orateurs*, 1753, 12mo. 3 vols. 5. *Histoire des Guerres civiles de France sous les regnes de François* II. *Charles* IX. *Henri* III. *et Henri* IV. translated from the Italian of d'Avila.—In Mallet's work on the Poets, Orators, and the Belles Lettres, his object is no more than to explain with accuracy and precision the rules of the great masters, and to support them by examples from authors ancient and modern. The style of his different writings, to which his mind bore a great resemblance, was neat, easy, and unaffected. But what must render his memory estimable, was his attachment to his friends, his candour, moderation, gentleness, and modesty. He was employed to write the theological and belles lettres articles in the *Encyclopédie;* and whatever he wrote in that dictionary was in general well composed. Abbé Mallet was preparing two important works when the world was deprived of him by death. The first was *Une Histoire generale de nos Guerres depuis le commencement de la Monarchie;* the second, *Une Histoire de Concile de Trente*, which he intended to set in opposition to that of Father Paul translated by Father le Courayer.

MALLET, a large kind of hammer made of wood; much used by artificers who work with a chissel, as sculptors, masons, and stone-cutters, whose mallet is ordinarily round; and by carpenters, joiners, &c. who use it square. There are several sorts of mallets used for different purposes on ship-board. The calking mallet is chiefly employed to drive the oakum into the seams of a ship, where the edges of the planks are joined to each other in the sides, deck, or bottom. The head of this mallet is long and cylindrical, being hooped with iron to prevent it from splitting in the exercise of calking. There is also the serving mallet, used in serving the rigging, by binding the spun yarn more firmly about it than it could possibly be done by hand, which is performed in the following manner; the spun-yarn being previously rolled up in a large ball or clue, two or three turns of it are passed about the rope, and about the body of the mallet, which for this purpose is furnished with a round channel in its surface, that conforms to the convexity of the rope intended to be served. The turns of the spun-yarn being strained round the mallet, so as to confine it firmly to the rope, which is extended above the deck, one man passes the ball continually about the rope, whilst the other, at the same time, winds on the spun-yarn by means of the mallet, whose handle acting as a lever strains every turn about the rope as firm as possible.

MALLICOLLO, one of the largest of the New Hebrides, in the Pacific ocean. It extends twenty leagues from north to south. Its inland mountains are very high, and clad with forests. Its vegetable productions are luxuriant, and in great variety; cocoa-nuts, breadfruit, bananas, sugar-canes, yams, eddoes, turmeric, and oranges. Hogs and common poultry are the domestic animals. The inhabitants appear to be of a race totally distinct from those of the Friendly and Society islands. Their form, language, and manners, are widely different. They seem to correspond in many particulars with the natives of New Guinea, particularly in their black colour and woolly hair. They go almost naked, are of a slender make, have lively but very irregular ugly features, and tie a rope fast round their belly. They use bows and arrows as their principal weapons, and the arrows are said to be sometimes poisoned. They keep their bodies entirely free from punctures, which is one particular that remarkably distinguishes them from the other tribes of the Pacific ocean.

Mallicollo || Malmsbury.

The population, according to Mr Forster, may amount to 50,000, who occupy 600 square miles of ground. The same author informs us that very few women were seen, but that those few were no less ugly than the men, were of small stature, and their heads, faces, and shoulders were painted red. They had bundles on their backs containing their children, and the men seemed to have no kind of regard for them. They appeared in fact to be oppressed, despised, and in a state of servility.

The men use bows and arrows, and a club about 30 inches long, which they hang on their right shoulder, from a thick rope made of a kind of grass. They live chiefly on vegetables, and apply themselves to husbandry. Their music had nothing remarkable in it, either for harmony or variety, but seemed to Mr Forster to be of a more lively turn than that at the Friendly islands. In some of their countenances he thought he could trace a mischievous, ill-natured disposition, but he confesses that he might mistake jealousy for hatred. It is in 16° 28′ S. Lat. and 167° 56′ E. Long.

MALLOW, a manor, and also a borough town in the county of Cork, and province of Munster, in Ireland, above 118 miles from Dublin, pleasantly situated on the north bank of the Blackwater, over which there is an excellent stone bridge. Not far distant is a fine spring of a moderately tepid water, which bursts out of the bottom of a fine limestone rock, and approaches the nearest in all its qualities to the hot-well waters of Bristol of any that has been yet discovered in this kingdom, which brings a resort of good company there frequently in the summer months, and has caused it to be called the *Irish Bath*.

MALLOW. See MALVA, BOTANY *Index*.

Marsh-MALLOW. See ALTHÆA, BOTANY *Index*.

Indian-MALLOW. See SIDA, BOTANY *Index*.

MALMSBURY, a town of Wiltshire in England, 95 miles from London. It stands on a hill, with six bridges over the river Avon at the bottom; with which and a brook that runs into it, it is in a manner encompassed. It formerly had walls and a castle, which was pulled down to enlarge the abbey, which was the largest in Wiltshire, and its abbots sat in parliament. The Saxon king Athelstan granted the town large immunities, and was buried under the high altar of the church, and his monument still remains in the nave of it. The memory of Aldhelm, its first abbot, who was the king's great favourite, and whom he got to be canonized after his death, is still kept up by a meadow near this town, called Aldhelm's Mead. By charter of King William III. the corporation consists of an alderman, who is chosen yearly, 12 capital burgesses, and 4 assistants. Here is an alms-house for 4 men and 4 women, and near the bridge an hospital for lepers, where it is supposed there was formerly a nunnery. This town contained, in 1811, 1152 inhabitants, and has a considerable trade in the woollen manufactory; has

Malmsbury, Malo.

has a market on Saturday, and three fairs. It has sent members to parliament ever since the 26th of Edward I.

William of MALMSBURY. See WILLIAM.

MALO, ST, a sea-port town of France, in the province of Britanny, situated in the latitude of 48 degrees 38 minutes north, and 1 degree 57 minutes to the west. The town stands upon a rock called the island of St Aaron, surrounded by the sea at high water, which is now joined to the continent, by means of a sort of causeway or dike, near a mile long, called the Sillon; which has often been damaged by storms, and was almost quite ruined in the year 1730. At the end of this causeway next the town is a castle, flanked with large towers, a good ditch, and a large bastion. The city nearly covers the whole surface of the island, and is of an oblong form, surrounded with a strong rampart, on which there is a number of cannon.—There is always in it a good garrison. The cathedral church is dedicated to St Vincent, and stands in the square of the same name, as do also the town-house and the episcopal palace. There are some other squares in the place, but less remarkable; and as to the streets, except two or three, they are all very narrow. There being no springs of fresh water in St Malo, the inhabitants are at great pains to convey the rain which falls on the roofs of their houses into cisterns; and of this they have enough for all family uses. There is only one parish church in the town, though it contain between 9000 and 10,000 inhabitants; but there are several convents of monks and nuns, and a general hospital. The two entrances into the harbour are defended by several forts, such as that of the Conchal; of the great and the little bay; the forts of Isle Rebours, Sezembre, Rotencuf; the castle of Latte, and Fort-Royal. These are several little isles near the harbour, the most considerable whereof is that of St Sezembre, which is near a quarter of a league in circumference, and serve as so many outworks to the fortifications of the city, and are useful as bulwarks, by breaking the violence of the waves, which otherwise would beat with great force against the walls of the city. At the end of the causeway next the continent stands the suburb of St Servant, large and well built. Here the merchants have their houses and storehouses. Here is the dockyard; and a secure harbour is formed by the river Rance, where ships of great burden can ride at anchor very near the houses. The harbour is one of the best in the kingdom, and most frequented by merchant ships; but it is of very difficult and dangerous, access on account of the rocks which lie round it. The town of St Malo is exceedingly well situated for trade; and accordingly, in this respect, it has succeeded beyond most towns in France. It maintains a trade with England, Holland, and Spain.—The commerce of Spain is of all the most considerable, and most profitable to the inhabitants of St Malo, the ships of the Malouins being frequently employed as register ships by the Spaniards, to carry out the rich cargoes to Peru and Mexico, and bring home treasure and plate from America. The inhabitants of St Malo carry on also a considerable trade in dry and salted cod to Newfoundland. They send to this fishery a good many vessels from 100 to 300 tons burden, with salt for the fish, and provisions for subsisting the crews. They carry their fish to Italy, Spain, and some to Bourdeaux and Bayonne, and bring home the returns in fruits, soap, oil, &c. which are disposed of to great advantage at Nantz. St Malo is the capital of the bishopric of that name, which is of considerable extent; and the soil about it produces most kinds of grain and fruits in great abundance. The most remarkable towns in the district and diocese of St Malo, are St Servand, Cancalle, Chateauneuf, Dinau, Tintiniac, Combourg, Montfort, Breal, Guer, Ploermel, Josselin, &c.

Malo. Malouin.

MALO, *Maclou*, or *Mahout*, Saint, the son of an Englishman, and cousin to St Magloire, was educated in a monastery in Ireland, and afterwards chosen bishop of Gui-Castel, a dignity which his humility prevented him from accepting. The people wishing to compel him, he went to Britanny, and put himself under the direction of a holy anchoret called Aaron, in the neighbourhood of Aleth. Some time after, about the year 541, he was chosen bishop of that city, and there cultivated piety and religion with great success. He afterwards retired to a solitude near Xaintes, where he died November 15. 565. From him the city of St Malo derives its name; his body having been carried thither, after the reduction of Aleth to a small village called *Guidalet* or *Guichalet*, and the transference of the episcopal see to St Malo.

MALOUIN, PAUL-JAQUES, born at Caen in 1701, was professor of medicine in the royal college of Paris, physician in ordinary to the queen, and a member of the Royal Society of London, and of the Academy of Sciences of Paris. These stations were a proper reward for his very extensive information in medicine and chemistry; and his amiable and steady character procured him many friends and protectors. He was very unlike some modern physicians, who put little trust in medicine; and was greatly displeased to hear any ill spoken of his profession. He observed one day to a young man who took this liberty, that all great men had respected medicine: *Ah!* said the young fellow, *you must at least except from the list one Moliere. But then*, instantly replied the doctor, *you see he is dead.* He is said to have believed the certainty of his art as firmly as a mathematician does that of geometry. Having prescribed a great many medicines for a celebrated man of letters, who followed his directions exactly, and was cured, Malouin eagerly embraced him, saying, *You deserve to be sick.* As he valued the rules of medicine still more on his own account than on that of others, he observed, especially in the latter part of his life, a very austere regimen. He strictly practised the preservative part of medicine, which is much more certain in its effects than the restorative. To this regimen Malouin was indebted, for what many philosophers have desired in vain, a healthy old age and an easy death. He was a stranger to the infirmities of age; and died at Paris of an apoplexy, the 3d of January 1778, in the 77th year of his age. By his will he left a legacy to the faculty of medicine, upon condition of their holding a public meeting every year for the purpose of giving the public an account of his labours and discoveries. Malouin was economical, but at the same time very disinterested. After two years of very lucrative practice, he left Paris and went to Versailles, where he saw very few patients, observing

Malouin || Malplaquet.

that he had *retired to the court*. His principal works are, 1. *Traité de Chimie*, 1734, 12mo. 2. *Chimie Medicinale*, 2 vols. 12mo, 1755; a book full of curious observations, and written in a chaste and well adapted style. He had the character of a laborious chemist; and he was a well-informed and even a distinguished one for the age in which he lived: but his knowledge of chemistry, it must be confessed, was very imperfect, compared with the state of the science in the present age, in which it has assumed a new face, that probably will not be the last. 3. Some of the articles in the Collection published by the Academy of Sciences on the arts and professions. A circumstance which happened at a meeting of the academy does as much honour to his heart, as any of his works do to his understanding. A new treatise on the art of baking, wherein some of Malouin's ideas were combated, was read by M. Parmentier before his fellows, among whom was the old doctor. The young academician, who knew how easily self-love is hurt, was afraid to meet his looks: but no sooner was the reading finished, than Malouin went up to him, and embracing him, "Receive my respects (said he), you have seen farther into the subject than I did." 4. He was likewise the author of the chemical articles in the *Encyclopédie*.

Of the same family was *Charles* MALOUIN, who graduated as a doctor of medicine in the university of Caen, and died in 1718 in the flower of his age. He published a Treatise on Solids and Fluids, Paris 1718, 12mo.

MALPAS, a town of Cheshire, 166 miles from London. It stands on a high hill, nor far from the river Dee, on the borders of Shropshire; has a grammar school, and an hospital, and had formerly a castle. It is called in Latin *Mala Platea*, i. e. "Ill Street," and was, for the same reason, by the Normans, called *Mal Pas;* but its three streets, of which it chiefly consists, are now well paved; and here is a benefice rich enough to support two rectors, who officiate alternately in its stately church. The population of this place in 1811 was 938.

MALPIGHI, MARCELLUS, an eminent Italian physician and anatomist in the 17th century. He studied under Massari and Mariano. The duke of Tuscany invited him to Pisa, to be professor of physic there. In this city he contracted an intimate acquaintance with Borelli, to whom he ascribed all the discoveries he had made. He went back to Bologna, the air of Pisa not agreeing with him. Cardinal Antonio Pignatelli, who had known him while he was legate at Bologna, being chosen pope in 1691, under the name of *Innocent XII.* immediately sent for him to Rome, and appointed him his physician. But this did not hinder him from pursuing his studies, and perfecting his works, which have immortalized his memory. He died in 1694; and his works, with his life written by himself, prefixed, were first collected and printed at London, in folio, in 1667.

MALPIGHIA, BARBADOES CHERRY; a genus of plants belonging to the decandria class; and in the natural method ranking under the 23d order, *Trihilatæ*. See BOTANY *Index*.

MALPLAQUET, a village of the Netherlands, in Hainault, famous for a most bloody battle fought here on the 11th of September 1709, between the French under old Marshal Villars, and the allies commanded by Prince Eugene and the duke of Marlborough. The French army amounted to 120,000 men; and were posted behind the woods of La Marte and Teniers, in the neighbourhood of Malplaquet. They had fortified their situation in such a manner with lines, hedges, and trees laid across, that they seemed to be quite inaccessible. In this situation they expected certain victory; and even the common soldiers were so eager to engage, that they flung away the bread which had been just given them, though they had taken no sustenance for a whole day before. The allied army began the attack early in the morning, being favoured by a thick fog. The chief fury of their impression was made upon the left of the enemy; and with such success, that, notwithstanding their lines and barricadoes, the French were in less than an hour driven from their entrenchments. But on the enemy's right the combat was sustained with much greater obstinacy. The Dutch, who carried on the attack, drove them from their first line; but were repulsed from the second with great slaughter. The prince of Orange, who headed that attack, persisted in his efforts with incredible perseverance and intrepidity, though two horses had been killed under him, and the greater part of his officers slain and disabled. At last, however, the French were obliged to yield up the field of battle; but not till after having sold a dear-bought victory. Villars being dangerously wounded, they made an excellent retreat under the conduct of Boufflers, and took post near Guesnoy and Valenciennes. The conquerors took possession of the field of battle, on which above 20,000 of their best troops lay dead. The loss of the French, it is said, did not exceed 8000; and Marshal Villars confidently asserted, that, if he had not been disabled, he would have gained an undoubted victory.

Malplaquet, Malt.

MALT, denotes barley cured, or prepared to fit it for making a potable liquor, under the denomination *beer* or *ale*. See BREWING in this work, and the same article in the SUPPLEMENT.

MALT-Liquors have different names as well as different virtues, properties, and uses, both from the different manners of preparing the malt, whence they are distinguished into *pale* and *brown;* and from the different manners of preparing or brewing the liquors themselves; whence they are divided into *beer* and *ale*, *strong* and *small*, *new* and *old*.

Malt drinks are either pale or brown, as the malt is more or less dried on the kiln: that which is the slenderest dried tinging the liquor least in brewing, and therefore being called *pale;* whereas that higher dried, and as it were roasted, makes it of a higher colour. A mixture of both makes an amber colour; whence several of these liquors take their name.

Now, it is certain, the pale malt has most of the natural grain in it, and is therefore the most nourishing; but, for the same reason, it requires a stronger constitution to digest it. Those who drink much of it, are usually fat and sleek in the bloom, but are often cut off by sudden fevers; or, if they avoid this, they fall early into a distempered old age.

The brown malt makes a drink much less viscid, and fitter to pass the several strainers of the body; but, if very strong, it may lead on to the same inconvenien-

ces

Malt. ces with the pale: though a single debauch wears off much more easily in the brown.

Dr Quincy observes, that the best pale malt-liquors are those brewed with hard waters, as those of springs and wells, because the mineral particles, wherewith these waters are impregnated, help to prevent the cohesions of those drawn from the grain, and enable them to pass the proper secretions the better; as the viscid particles of the grain do likewise defend these from doing the mischief they might otherwise occasion. But softer waters seem best suited to draw out the substance of high dried malts, which retain many fiery particles in their contexture, and are therefore best lost in a smooth vehicle.

For the differences in the preparation of malt liquors, they chiefly consist in the use of hops, as in beer; or in the more sparing use of them, as in ale.

The difference made by hops is best discovered from the nature and quality of the hops themselves: these are known to be a subtle grateful bitter; in their composition, therefore, with this liquor, they add somewhat of an alkaline nature, i. e. particles that are sublime, active, and rigid. By which means, the ropy viscid parts of the malt are more divided and subtilized: and are therefore not only rendered more easy of digestion and secretion in the body, but also, while in the liquor, they prevent it from running into such cohesions as would make it ropy, vapid, and sour.

For want of this, in unhopped drinks, that clammy sweetness, which they retain after working, soon turns them acid and unfit for use; which happens sooner or later in proportion to the strength they receive from the malt, and the comminution that it has undergone by fermentation.

The different strengths of malt liquors also make their effects different. The stronger they are, the more viscid parts they carry into the blood; and though the spirituous parts make these imperceptible at first, yet when those are evaporated, which will be in a few hours, the other will be sensibly felt by pains in the head, nauseousness at the stomach, and lassitude or listlessness to motion. This those are the most sensible of who have experienced the extremes of drinking these liquors and wines; for a debauch of wine they find much sooner worn off, and they are much more lively and brisk afterwards, than after fuddling malt liquors, whose viscid remains will be long before they be shaken off.

Malt liquors, therefore, are, in general, the more wholesome for being small; i. e. of such a strength as is liable to carry a small degree of warmth into the stomach, but not so great as to prevent their being proper diluters of the necessary food. Indeed, in robust people, or those who labour hard, the viscidities of the drink may be broken into convenient nourishment; but in persons of another habit and way of living, they serve rather to promote obstructions and ill humours.

The age of malt liquors is the last thing by which they are rendered more or less wholesome. Age seems to do nearly the same thing as hops; for those liquors which are longest kept are certainly the least viscid; age breaking the viscid parts, and by degrees rendering them smaller, and fitter for secretion.

But this is always determined according to their strength; in proportion to which, they will sooner or later come to their full perfection as well as decay; for, when ale or beer is kept till its particles are broken and comminuted as far as they are capable, then it is that they are best; and, beyond this, they will be continually on the decay, till the finer spirits are entirely escaped, and the remainder becomes vapid and sour. Malt

Malt-Distillery. This is an extensive article of trade; and by which very large fortunes are made. The art is to convert fermented malt liquors into a clear inflammable spirit, which may be either sold for use in the common state of a proof strength, that is, the same strength with French brandy; or is rectified into that purer spirit usually sold under the name of *spirit of wine*; or made into compound cordial waters, by being distilled again from herbs and other ingredients. See BREWING and WASH.

To brew with malt in the most advantageous manner, it is necessary, 1. That the subject be well prepared; 2. That the water be suitable and duly applied; and, 3. That some certain additions be used, or alterations made, according to the season of the year, and the intention of the operator: and by a proper regulation in these respects, all the fermentable parts of the subject will thus be brought into the tincture, and become fit for fermentation.

The due preparation of the subject consists in its being justly malted and well ground. When the grain is not sufficiently malted, it is apt to prove hard, so that the water can have but very little power to dissolve its substance; and if it be too much malted, a part of the fermentable matter is lost in that operation. The harder and more flinty the malt is, the finer it ought to be ground; and in all cases, when intended for distillation, it is advisable to reduce it to a kind of finer or coarser meal. When the malt is thus ground, it is found by experience that great part of the time, trouble, and expence of the brewing is saved by it, and yet as large a quantity of spirit will be produced; for thus the whole substance of the malt may remain mixed among the tincture, and be fermented and distilled among it. This is a particular that very well deserves the attention of the malt distiller as that trade is at present carried on; for the despatch of the business, and the quantity of spirit procured, is more attended to than the purity or perfection of it.

The secret of this matter depends upon the thoroughly mixing or briskly agitating and throwing the meal about, first in cold and then in hot water; and repeating this agitation after the fermentation is over, when the thick turbid wash being immediately committed to the still already hot and dewy with working, there is no danger of burning, unless by accident, even without the farther trouble of stirring, which in this case is found needless, though the quantity be ever so large, provided that requisite care and cleanliness be used; and thus the business of brewing and fermenting may very commodiously be performed together, and reduced to one single operation. Whatever water is made choice of, it must stand in a hot state upon the prepared malt, especially if a clear tincture be desired; but a known and very great inconvenience attends its being applied too hot, or too near

to

Malt. to a state of boiling, or even scalding with regard to the hand. To save time in this case, and to prevent the malt running into lumps and clods, the best way is to put a certain measured quantity of cold water to the malt first; the malt is then to be stirred very well with this, so as to form a sort of thin uniform paste or pudding; after which the remaining quantity of water required may be added in a state of boiling, without the least danger of making what, in the distiller's language, is called a *pudden*.

In this manner the due and necessary degree of heat in the water, for the extracting all the virtues of the malt, may be hit upon very expeditiously, and with a great deal of exactness, as the heat of boiling water is a fixed standard which may be let down to any degree by a proportionate mixture of cold water, due allowances being made for the season of the year, and for the temperature of the air.

This little obvious improvement, added to the method just above hinted for the reducing brewing and fermentation to one operation, will render it practicable to very considerable advantage, and the spirit improved in quality as well as quantity.

A much more profitable method than that usually practised for the fermenting malt for distillation, in order to get its spirit, is the following: Take ten pounds of malt reduced to a fine meal, and three pounds of common wheat meal: add to these two gallons of cold water, and stir them well together; then add five gallons of water, boiling hot, and stir altogether again. Let the whole stand two hours, and then stir it again; and when grown cold, add to it two ounces of solid yeast, and set it by loosely covered in a warmish place to ferment.

This is the Dutch method of preparing what they call the *wash for malt spirit*, whereby they save much trouble and procure a large quantity of spirit: thus commodiously reducing the two businesses of brewing and fermenting to one single operation. In England the method is to draw and mash for spirit as they ordinarily do for beer, only instead of boiling the wort, they pump it into large coolers, and afterwards run it into their fermenting backs, to be there fermented with yeast. Thus they bestow twice as much labour as is necessary, and lose a large quantity of their spirit by leaving the gross bottoms out of the still for fear of burning.

All simple spirits may be considered in the three different states of low wines, proof spirit, and alcohol, the intermediate degrees of strength being of less general use; and they are to be judged of only according as they approach to or recede from these. Low wines at a medium contain a sixth part of pure inflammable spirit, five times as much water as spirit necessarily arising in the operation with a boiling heat. Proof goods contain about one half of the same totally inflammable spirit; and alcohol entirely consists of it.

Malt low wines, prepared in the common way, are exceeding nauseous; they have, however, a natural vinosity or pungent agreeable acidity, which would render the spirit agreeable to the palate, were it not for the large quantity of the gross oil of the malt that abounds in it. When this oil is detained in some measure from mixing itself among the low wines, by the stretching a coarse flannel over the neck of the still or at the orifice of the worm, the spirit becomes much purer in all respects; it is less fulsome to the taste, less offensive to the smell, and less milky to the eye. When these low wines, in the rectification into proof spirits, are distilled gently, they leave a considerable quantity of this gross fetid oil behind them in the still along with the phlegm; but if the fire be made fierce, this oil is again raised and brought over with the spirit; and being now broken somewhat more fine, it impregnates it in a more nauseous manner than at first. This is the common fault both of the malt distiller and of the rectifier: the latter, instead of separating the spirit from this nasty oil, which is the principal intent of his process, attends only to the leaving the phlegm in such quantity behind, that the spirit may be of a due strength as proof or marketable goods, and brings over the oil in a worse state than before. To this inattention to the proper business of the process, it is owing, that the spirit, after its several rectifications, as they are miscalled, is often found more stinking than when delivered out of the hands of the malt distiller. All this may be prevented by the taking more time in the subsequent distillations, and keeping the fire low and regular; the sudden stirring of the fire, and the hasty way of throwing on the fresh fuel, being the general occasion of throwing up the oil by spurts, where the fire in general, during the process, has not been so large as to do that mischief. Malt

The use of a balneum mariæ, instead of the common still, would effectually prevent all this mischief, and give a purer spirit in one rectification than can otherwise be procured in ten, or indeed according to the common methods at all.

Malt low wine, when brought to the standard of proof spirit, loses its milky colour, and is perfectly clear and bright, no more oil being contained in it than is perfectly dissolved by the alcohol, and rendered miscible with that proportion of phlegm, which is about one half the liquor: its taste also is cleaner, though not more pleasant; there being less of the thick oil to hang on the tongue in its own form; which is not the case in the low wines, where the oil being undissolved, adheres to the mouth in its own form, and does not pass lightly over it.

When proof spirit of malt is distilled over again, in order to be rectified into alcohol, or, as we usually call it, spirits of wine, if the fire be raised at the time when the faints begin to fall off, a very considerable quantity of oil will be raised by it, and will run in the visible form of oil from the nose of the worm. This is not peculiar to malt spirit; but the French brandy shows the same phenomenon, and that in so great a degree, that half an ounce of this oil may be obtained from a single piece of brandy.

Malt spirit, more than any other kind, requires to be brought into the form of alcohol, before it can be used internally, especially as it is now commonly made up in the proof state, with as much of this nauseous and viscous oil as will give it a good crown of bubbles. For this reason it ought to be reduced to an alcohol, or totally inflammable spirit, before it is admitted into any of the medicinal compositions. If it be used without this previous caution, the taste of the malt oil will

Malt. be distinguished among all the other flavours of the ingredients.

A pure spirit being this procured, should be kept carefully in vessels of glass or stone, well stopped, to prevent the evaporation of any of its volatile parts. If preserved in casks, it is apt to impregnate itself very strongly with the wood. The quantity of pure alcohol obtainable from a certain quantity of malt, differs according to the goodness of the subject, the manner of the operation, the season of the year, and the skilfulness of the workmen; according to which variations, a quarter of malt will afford from eight or nine to 13 or 14 gallons of alcohol. This should encourage the malt distiller to be careful and diligent in his business, as so very large a part of his profit depends wholly on the well conducting his processes.

After every operation in this business, there remains a quantity of faints, which in their own coarse state ought never to be admitted into the pure spirit; these are to be saved together, and large quantities of them at once wrought into alcohol. It is easy to reduce these to such a state that they will serve for lamp-spirits. Their disagreeable flavour being corrected by the adding of aromatics during the distillations, the reducing them into a perfect and pure alcohol is practicable, but not without such difficulties as render it scarcely worth the trader's while. One way of doing it is by distilling them from water into water, and that with a very slow fire. By this means a pure alcohol may be made out of the foulest faints.

The malt distiller always gives his spirit a single rectification *per se*, in order to purify it a little, and make it up proof; but in this state it is not to be reckoned fit for internal uses, but serves to be distilled into geneva and other ordinary compound strong waters for the vulgar.

The Dutch, who carry on a great trade with malt spirit, never give it any farther rectification than this; and it is on this account that the malt spirit of England is in general so much more in esteem. The Dutch method is only to distil the wash into low wines, and then to full proof spirit; they then directly make it into geneva, or else send it as it is to Germany, Guinea, and the East Indies, for the Dutch have little notion of our rectification. Their spirit is by this means rendered very foul and coarse, and is rendered yet more nauseous by the immoderate use they make of rye meal. Malt spirit, in its unrectified state, is usually found to have the common bubble proof, as the malt distiller knows that it will not be marketable without it.

The whole matter requisite to this is, that it have a considerable portion of the gross oil of the malt well broke and mixed along with it; this gives the rectifier a great deal of trouble if he will have the spirit fine; but in the general run of the business, the rectifier does not take out this oil, but breaks it finer, and mixes it faster in by alkaline salts, and disguises its taste by the addition of certain flavouring ingredients. The spirit loses in these processes the vinosity it had when it came out of the hands of the malt distiller, and is in all respects worse, except in the disguise of a mixed flavour.

The alkaline salts used by the rectifier destroying the natural vinosity of the spirit, it is necessary to add an extraneous acid in order to give it a new one. The acid they generally use is the spiritus nitri dulcis; and the common way of using it is the mixing it to the taste with the rectified spirit: this gives our malt spirit, when well rectified, a flavour somewhat like that of French brandy, but this soon flies off; and the better method is to add a proper quantity of Glauber's strong spirit of nitre to the spirit in the still. The liquor in this case comes over impregnated with it, and the acid being more intimately mixed, the flavour is retained. See BREWING and DISTILLING, SUPPLEMENT. Malt, Malta.

MALT-bruiser, or *Bruising-mill*. It has been found by repeated experiments, that bruising malt is a more advantageous method than the old one of grinding and flouring. By bruising, there is not only less waste, but the malt is also better fitted for giving out all its virtues. It has therefore become a practice to squeeze malt between rollers, by means of a proper apparatus, of which various constructions have been invented. One of the best contrivances of this sort is said to be the bruising-mill of Mr Winlaw, which consists of a frame, a large cylinder or roller, a small roller, a hopper, a shoe, a frame to support the hopper, a fly wheel, and a windlass. To use this engine, it is directed to screw the large roller up to the small one, and not to feed too fast from the shoe, which is regulated by pins that have strings fixed to them. It is evident, that when two smooth surfaces are opposed to each other at a distance which can be regulated at pleasure, neither grain nor any other similar substance can pass between them without being bruised. This being the principle on which the bruising-mill acts, the mealy substance, which is the essential part of malt, is entirely removed from the skin or husk which contains it, and all the virtues of the malt are with ease extracted by the water in a manner superior to what is effected when the grain is only cut by grinding. The operation is at the same time so expeditiously performed, that two men can with ease bruise a bushel of malt in a minute. By the same engine may also be bruised oats and beans for horses. A great part of the corn given these animals, it is well known, is swallowed whole, and often passes through them in the same state; in which case, they cannot receive any nourishment from the grains that are unbroken; but when bruised in this engine, it eases mastication; and every grain being prepared for nutrition, a much less quantity will of course be found to be sufficient. For bruising beans, the two regulating screws must be unscrewed a little; and the fly-wheel requires to be then set in motion with the hand, on account that the rollers are then a little space apart, and will not turn each other before the beans come between them.

MALT-Tax, is the sum of 750,000l. raised every year by parliament since 1697, by a duty of 6d. on the bushel of malt, and a proportionable sum on certain liquors, such as cyder and perry, which might otherwise prevent the consumption of malt. This is under the management of the commissioners of the excise; and is indeed itself no other than the annual excise. In 1760, an additional perpetual excise of 3d. per bushel was laid upon malt; and in 1763, a proportional excise was laid upon cyder and perry, but new-modelled in 1766. See EXCISE.

MALTA, a celebrated island of the Mediterranean, situated

Malta. situated between the 15th and 16th degrees of east longitude, and between the 35th and 36th degrees of north latitude. It is about 19 or 20 miles in length, nine or ten in breadth, and 60 in circumference. Anciently it was called *Melita;* and is supposed by Cluverius, from its situation and other particulars, to be the Hyperia mentioned by Homer, whence the Phæaces were afterwards driven by the Phenicians, and retired into Scheria and the island of Corfu; which is the more probable, as the ancient poet places the mountain Melita in that island. He has likewise brought some probable arguments to prove, that Melita or Malta is the ancient *Ogygia;* in which the famed nymph *Calypso*, daughter of the Ocean and Thetis, received the shipwrecked Ulysses, and detained him seven years.

1 Ancient history of the island.

The most ancient possessors of Malta, of whom we have any certain account, were the Carthaginians; from whom it was taken by the Romans: and yet during the whole time that it continued under the power of these polite nations it was almost entirely barren The soil was partly sandy and partly rocky, having scarcely any depth of earth; and withal so stony, that it was hardly capable of producing corn or any other grain except cummin, and some seeds of a similar nature. Its chief products were figs, melons, honey, cotton, and some few other fruits and commodities, which the inhabitants exchanged for corn; and in this barren state it seems to have continued till it came into the possession of the Maltese knights. It laboured also under great scarcity of water and fuel: upon all which accounts it was till that time but thinly inhabited, there being only about 30 or 40 boroughs or other villages scattered about, and no city except the capital, called also *Malta*, and the town and fort of St Angelo, which defended the harbour: so that the whole number of its inhabitants did not exceed 12,000, including women and children; the greatest part of whom were very indigent.

According to an ancient tradition, Malta was first possessed by an African prince named *Battus*, an enemy to Queen Dido; from whom it was taken by the Carthaginians; from the Carthaginians it passed to the Romans, who made themselves masters of it when they subdued the island of Sicily. These were driven out by the Arabs in the year 828; who were driven out in their turn by Roger the Norman, earl of Sicily, who took possession of it in 1190: from which time it continued under the dominion of the Sicilian princes till the time of Charles V. when it fell under his power, along with Naples and Sicily. To cover the island of Sicily from the Turks, Charles gave the island to the *knights of Rhodes*, since that time called *knights of Malta*, whose origin and history is given under the article *Knights of* Malta *and* Rhodes.

2 Malta given to the knights of Rhodes.

At the first landing of the Maltese knights, they found themselves obliged to lodge in a very poor town at the foot of the hill on which stands the castle of St Angelo, and where their only habitations were fishermen's huts. The grand master, with the principal knights, took possession of the castle, where the accommodations were somewhat better; though these too were very mean, and out of repair. Three days after, he took possession of the city, which was formerly called *Malta*, but since that time hath taken the name of the *Notable City;* and after that, of the whole island of Malta, and the neighbouring one of Gosa. Malta

The first care of the knights, after having settled their authority through the two islands, was to provide some better accommodation for the present, and to choose a proper place where to fix their habitation. But as the island had no other defence than the old castle of St Angelo, and was so much exposed on all sides, that it would have required greater sums than their exhausted treasury could spare to put it in a proper state of defence; the grand master was obliged to content himself with surrounding the borough above mentioned, wherein he had ordered new buildings to be reared for the present habitation of his knights, with a stout wall, to prevent its being surprised by the Turkish and Barbary corsairs. His design, indeed, at this time, was not to have fixed the abode of the knights in the bare and defenceless island of Malta, but to stay in it only till he had got a sufficient force to attempt the conquest of *Modon*, a town of the Morea, and which was not only a populous and opulent place, but lay very convenient for making an attempt on the island of Rhodes, their ancient habitation, and to which they were naturally attached. This, however, did not hinder his taking all proper measures for securing Malta as well as Gosa, and laying out a proper plan for securing them from attacks, in case the design on Modon should fail.

3 They attempt the conquest of Modon without success.

In the mean time, as superstition was then universally prevalent, the grand master, among other precious relics which they had brought from Rhodes, caused the arm of St Catharine to be carried in procession to the cathedral. Whilst they were on their march, one of the centinels gave them notice, that a large Turkish merchantman was wrecked on their coast. The grand master immediately despatched some of his knights and soldiers thither; who finding Isaac the patron of the ship, a native of Modon, and one Maurithisala Nocher, an excellent engineer, they were retained in the service of the order, and the latter was immediately employed in fortifying the island.

The knights were hardly settled in Malta, when the emperor, and other European potentates, endeavoured to engage them in a war with the inhabitants of Barbary, as the city of Tripoli, then held by Charles, was in great danger of falling into the hands of the infidels. The attempt on Modon, however, was first made; but it proved unsuccessful, through the base avarice of the Maltese forces: for they having been admitted into the city, during the night began to murder and plunder the inhabitants, without waiting for the arrival of the galleys which were coming to their assistance. The consequence was, that the inhabitants armed, and a desperate battle began; in which the Maltese, notwithstanding the utmost efforts, were obliged to retire, but not till they had loaded themselves with plunder, and carried away 800 women captive.

The grand master, looking upon this disappointment as a sign that Providence had ordained Malta to be the residence of the knights, did not renew his attempts upon Modon; but, in 1532, joined with the emperor against the Turks, and sent a great number of his galleys to join the confederate fleet under the celebrated Andrew Doria. In consequence of this aid, the undertaking proved successful; and in all probability the

4 Join the emperor against the Turks.

Malta. conquest of Modon would have been accomplished, had not the soldiery, discouraged by the bad success of the last attempt, openly refused to proceed, and obliged the emperor to proceed to Coron, another town belonging to the Turks. Through the valour of the Maltese knights, this place was soon obliged to capitulate; and in a second expedition in 1533, the knights again distinguished themselves in a most eminent manner. They were quickly recalled, however, by the grand master to the defence of the island, which was now threatened with an invasion by Barbarossa the celebrated Turkish corsair, who scoured those seas at the head of above fourscore galleys. This invasion, however, did not take place; and in 1534 the grand master Villiers de l'Isle Adam died, and was succeeded by Perino de Ponte, a native of the town of Ast in Italy.

The new grand master, who received intelligence of his election at St Euphemia in Calabria, very soon after received another express, giving an account of the wars which at that time reigned in Tunis, and the danger that Tripoli as well as Malta was in from Barbarossa, who was by this time become master both of Algiers and Tunis; upon which he made all the haste he could to his new government. His first care was to send a strong reinforcement to Italy; after which, he despatched an embassy to the emperor, intreating him to equip a powerful fleet against Barbarossa, without which it would be impossible for Tripoli to hold out much longer.

5 Africa invaded by Charles. By this embassy from De Ponte, and another to the same purpose from Muley Hassen, the deposed king of Tunis, Charles was easily prevailed on to carry his arms into Africa; in which he was assisted by a great number of the bravest knights, together with 18 brigantines of different sizes, four of the best Maltese galleys, and their vessel called the *great carrack*, of itself almost equivalent to a squadron. In this expedition the knights distinguished themselves in a most eminent manner. At the siege of Goletta, one of the knights, named *Conversa*, an excellent engineer, by means of a *barca longa*, got almost close to the great tower, which he furiously battered with large cannon, while the great carrack, which was behind all the rest of the vessels, and by reason of its height could fire over them, did prodigious execution. A breach was soon made; and hardly was it wide enough to be scaled, when the Maltese knights jumped out of the galleys into their long-boats, and thence into the sea, with their swords in their hands, and waded through the water above their girdles, it being too shallow for boats to approach the shore. The standard-bearer of the order was the first that jumped into the water, and led the rest to the attack; they claiming everywhere the post of honour. They marched with the greatest resolution through the most terrible firing and showers of all kinds of missile weapons; and, having gained the shore, quickly ascended the breach, on the top of which they planted their great standard. A great number lost their lives, and scarcely one came off unwounded; but the emperor did them the justice to own, that the taking the place was chiefly owing to the valour of the Maltese knights.

6 Desperate valour of the Maltese knights.

The city of Tunis was soon taken after the fortress of Goletta; on the surrender of which, the emperor, designing to return into Europe, took his last dinner on board the great carrack; where he was magnificently entertained, and bestowed on the surviving knights the greatest encomiums, and marks of his esteem and gratitude to the owner. These he accompanied with considerable presents and with two new grants. By the first, they were allowed to import corn and other provisions from Sicily, without paying duty; and by the second, the emperor engaged, that none of the order should enjoy any of the estates or revenues, due to Maltese knights, throughout all his dominions, unless they were lawfully authorised by the grand master and his council; or till the originals had been examined and registered by himself, or such ministers as he should appoint for that purpose. The fleet then set sail for Malta; where, on their arrival, they received the news of the grand master's death, who was succeeded by Didier de Tolon de St Jalle, a native of Provence, and then grand prior of Thoulouse, where he resided at the time of his election. Malta.

7 Privileges conferred upon them by the emperor.

The present grand master was a man of great conduct and bravery, which he had formerly shown at the siege of Rhodes; and the situation of affairs at this time required a person of experience. The Turkish corsairs, quite tired out with the dreadful havock made among them by Botigella, grand prior of Pisa, who seldom quitted the sea, and never sailed out without sinking some of them, or making considerable prizes, had agreed to enter into a strong confederacy, either to surprise the city of Tripoli where his retreat was; or, if that failed, to lay siege to it by sea and land; in either of which attempts, they were sure of all the assistance of Barbarossa and Hayradin, then lord of Tangiers. This last had undertaken the command and conduct of the whole enterprise; but the governor being informed of the design, prepared to give him a warm reception. Hayradin came thither with his whole force in the dead of the night, and began to scale the walls in those places where he reckoned them to be most defenceless. They no sooner appeared at the foot of them, than the garrison, which had been kept up in arms, poured down such streams of wild-fire, boiling oil, melted lead, &c. and threw such volleys of stones, while the great and small guns so annoyed those that stood farthest off, that great numbers of them were destroyed. They persisted in the attack, however, with great fury and vigour, till Hayradin, who was foremost in one of the scalades, was knocked down by a musket-shot from the top of his ladder. He fell into the ditch, and was taken up almost dead; upon which his troops instantly dispersed themselves, and abandoned the enterprise. The governor of Tripoli, however, judging that this would not be the last visit of the kind which in all probability he would receive, immediately despatched an express to Malta, with proposals for fortifying the city, and demolishing a strong tower on that coast named *Alcaid*, which was held by a Turkish corsair. His advice being approved of, the commander Botigella, now general of the galleys, was immediately despatched with a sufficient force; who, having landed his men at Tripoli, immediately marched with them and a body of Arab mercenaries towards Alcaid; and without staying to open the trenches, or any other covering than his gabions, levelled his artillery against it. Hayradin being informed of this,

8 The Turks make an unsuccessful attempt on Tripoli.

came

Malta. came with his Turks to its defence; but was intercepted by a strong detachment of Maltese knights at the head of the hired Arabs, and repulsed with loss; so that all he could do was to convey about 50 or 60 Turks into the place, and to annoy the Christians with some slight skirmishes. Botigella, perceiving that his cannon did not make such quick despatch as he wished, sent some of his galleys; under the shelter of which he quickly sprung a mine, which brought down part of the wall, and buried most of the corsairs under it; upon which the rest, seeing the Maltese knights mount the breach sword-in-hand, immediately threw down their arms. The tower was then razed to the ground; after which Botigella marched to a town called *Adabus*, whence he drove Hayradin, who had intrenched himself in it, and gave the plunder to the Arabs. In his return he attacked and took a large Turkish galley, the cargo of which was valued at 160,000 crowns, and had on board 200 persons; so that he landed in triumph, and was received with the loud acclamations of the whole order, who came to meet him on his arrival. Soon after the grand master fell sick and died, and was succeeded by John de Homedes.

Fresh complaints having in 1564 been made to Soliman, he proposed, in a grand council where most of his officers attended, to extirpate the knights altogether. This design was strenuously opposed by Hali, one of Dragut's most experienced captains, who offered the most solid reasons against it; but being overruled by the rest, an expedition against Malta was resolved upon. One of the sultan's first cares was to send some spies, in the disguise of fishermen, to take a full view of the island, who found means to bring him an exact plan of it, with all its fortifications, havens, strength, the number of its inhabitants, &c. whilst he was hastening his armaments against it. By this time, as the Maltese had very little reason to doubt that the Turkish armaments were designed against their island, the viceroy of Sicily, Don Garcia, was ordered by his master to take it in his way to the castle of Goletta, in order to consult with the grand master about the necessary means for opposing such a formidable power. The grand master acquainted him, that, in case of an attack upon Malta, he should want both men and corn: upon which the viceroy engaged to supply him with both on his return to Sicily; in pledge of which he left one of his sons with him, who was afterwards admitted into the order. He was no sooner departed, than the grand master summoned all the knights of the order, dispersed through several parts of Europe, to repair to him. Those that were in Italy raised a body of 2000 foot, to which the viceroy of Sicily added two companies of Spanish forces. All the galleys of the order were employed in transporting these troops, together with all manner of provisions and ammunition, into the island; and the knights that were in it, in distributing, disciplining, and exercising their new levies, as well as the Maltese militia, against the siege. Thus the grand master saw himself strengthened by the arrival of 600 knights, all of whom brought with them retinues of stout good servants, fit to assist in the defence of the island; whilst those, who by reason of age, sickness, or other impediments, could not repair to him, sold their most valuable effects in order to assist him with their purses. The pope, on his part, contented himself with sending a supply of 10,000 crowns; and the king of Spain ordered his viceroy Don Garcia to raise an army of 20,000 men, to be ready to sail thither as soon as called for. The grand master employed the remainder of his time in visiting all the forts, magazines, arsenals, &c. and assigning to each tongue their several posts, and making all necessary preparations, till the Ottoman fleet appeared in sight on the 18th of May 1565. It consisted of 159 large galleys and galleons, carrying on board 30,000 forces, janizaries and spahis, besides the slaves at the oar, accompanied by a considerable number of other vessels, laden with artillery, ammunition, and other necessaries for a siege. The whole armament was commanded by Mustapha Basha, an old experienced officer, aged about 85 years, and an old favourite and confidant of the sultan; of a haughty cruel temper, who made it a merit to violate his word, and to use all manner of violence against the Christians, especially against the Maltese. This formidable army landed at some distance from Il Borgo, and soon afterwards spread themselves over the country; setting fire to the villages, putting the peasants to the sword, and carrying off such of the cattle as, notwithstanding the orders of the grand master, had not been secured within the forts and towns.

Malta. 9 The siege commenced.

While the Turks were thus employed, La Valette (the grand master) sent out De Copier, marshal of the order, with 200 horse and 600 foot, to watch their motions. De Copier, an officer of great experience, executed his commission with so much prudence and vigour, that, by falling unexpectedly on detached parties, he cut off 1500 Turks, with the loss only of 80 men.

The Turkish general held a council of war as soon as all his troops were landed, to assist him in resolving where he should begin his attack. Piali, the Turkish admiral, agreeably to what he understood to have been the sultan's instruction, was of opinion that they ought not to enter upon action till Dragut should arrive. But Mustapha having received information of the king of Spain's preparations, thought something ought to be done instantly for the safety of the fleet; which lay at present in a creek, where it was exposed to the violence of the east wind, and might be attacked with great advantage by the Spaniards. On this account he was of opinion, that they should immediately lay siege to a fort called *St Elmo*, which stood on a neck of land near Il Borgo, having the principal harbour on one side of it, and on the other another harbour large enough to contain the whole fleet in safety. This proposal was approved by a majority of the council, and Mustapha proceeded without delay to carry it into execution.

10 Desperate defence of fort St Elmo.

La Valette did not expect that a place which was neither strong nor large enough to admit a numerous garrison, could be defended long against so great a force as was employed to reduce it; but he thought it necessary that the siege of this fort should be prolonged as much as possible, in order to give the viceroy of Sicily time to come to his relief. With this view, he resolved to throw himself into St Elmo, with a select body of troops; and he was preparing to set out, when the whole body of knights remonstrated with such earnest importunity against his leaving the town,

Malta. town, that he at last consented to suffer the reinforcement, which he had prepared, to be conducted to the fort by a knight called *De Medran*, upon whose conduct and intrepidity he could rely with the most assured confidence.

Not long after De Medran's arrival in the fort, the garrison made a vigorous sally, in which they drove the enemy from their entrenchments, and put a number of them to the sword. But the rest soon recovered from their surprise; and having returned to the charge, they compelled the Christians to retire. In this rencounter, the vigorous efforts of the janizaries were favoured by the wind, which blew the smoke of the guns upon the fort, and covered the besieged with a thick cloud, through which it was impossible to discern the operations of the enemy. This incident the Turks had the presence of mind to improve to very great advantage. They seized, unperceived, upon the counterscarp; made a lodgement there with beams, woolsacks, and gabions; and raised a battery upon it with incredible expedition. After the smoke was dispersed, the besieged beheld what had been done with much astonishment: and they were the more disquieted, as the fortification which the Turks had raised upon their counterscarp overtopped a ravelin which lay near it, in which the besieged could no longer appear with safety. They resolved, however, to defend this ravelin as long as possible, whatever it should cost them.

In the mean time Dragut, and another noted corsair named Uluchiali, arrived with 20 galleys; having, besides slaves and seamen, 2500 troops on board. This reinforcement, and the presence of Dragut, added fresh vigour to the operations of the siege. This gallant corsair exposed himself, on all occasions, with the utmost intrepidity; spent whole days in the trenches; and as, besides his other extraordinary talents, he was particularly skilful in the management of artillery, he caused some new batteries to be raised in more advantageous situations than had hitherto been made choice of; and kept up a continual fire both on the ravelin above mentioned, and a cavalier that covered the fort and was one of its principal defences.

This cavalier soon became the only defence which could prevent the besiegers from coming up to the very foot of the wall. Some Turkish engineers having approached the ravelin at daybreak, to observe the effects of their artillery, they perceived a gun-port so low, that one of them, when mounted on the shoulders of another, looked into it, and saw the Christian soldiers lying on the ground asleep. Of this they gave immediate information to the troops; who, advancing as quickly and silently as possible, and clapping ladders to the gun-hole, got up into the ravelin, and cut most of the Christians to pieces.

Between this ravelin and the cavalier lay the ditch, over which the besieged had thrown a temporary bridge of planks leading up to the cavalier. The Turks, perceiving this, leaped instantly upon the bridge, and attempted to make themselves masters of the cavalier, as they already were of the ravelin. But the garrison was now alarmed; the bravest of the knights hastened from different quarters to the post of danger; and after an obstinate engagement, they compelled the Turks to retire into the ravelin. There, observing another way of reaching the cavalier by a path from the bottom of the ditch, they threw themselves down without dread or hesitation; and having ascended by this path to the other side, they renewed their attack with greater fury than ever. The combat lasted from sunrise till noon, when the knights at last proved victorious. About 20 knights and 100 soldiers were killed; and near 3000 of the enemy. Malta.

As the ravelin was open on the side towards the fort, the besieged pointed some cannon against it, and made great havock among the infidels. But Mustapha, sensible of the value of the acquisition he had made, poured in fresh soldiers without number, and the pioneers coming forward with woolsacks, planks, and gabions, put the troops at length in safety, and made a lodgment in the ravelin, of which the garrison were never afterwards able to dispossess them.

The grand master's concern on account of this disaster was greatly augmented, by considering that it could not have happened so soon without some negligence on the part of the garrison. He sent them, however, an immediate reinforcement; and both the siege and the defence were carried on with the same vigour as before.

But the situation of the besieged was now become much more dangerous than formerly. The Turks applied with unremitting diligence to heighten the ravelin till it overtopped the wall of the fort; and after this the garrison could no longer appear upon the parapet with safety. Many were killed by the enemy's artillery, several breaches were made in the wall, and the hearts of the bravest knights began to fail within them.

11
The knights desire permission to leave the fort, but are refused.

They agreed therefore, though with much reluctance, to apply to the grand master for liberty to quit the fort; and they made choice of the Chevalier de Medran for their messenger. He represented that the fort was in reality no longer tenable; and that, to continue in it, though only for a few days, would infallibly occasion the destruction of the garrison.

Most of the knights in council thought that this request of the garrison ought to be immediately granted. But La Valette was of a contrary opinion.—This he represented to the Chevalier de Medran; and sent him back with instructions to remind the knights of the vows which they took at their entrance into the order, of sacrificing their lives for its defence. He likewise bade him assure them, in his name, that he would not fail to send them such reinforcements as they should stand in need of; and was determined, as soon as it should be necessary, to come himself to their assistance, with a fixed unalterable purpose to lay down his life sooner than deliver the fort into the hands of the infidels.

This answer had the desired effect on several of the knights, and particularly on those whose principles of honour and attachment to the order were confirmed by years. But the greater part of them were much dissatisfied. They thought the grand master's treatment of them harsh and cruel; and wrote him a letter, subscribed by 53; in which they informed him, that, if he did not, on the next night, send boats to carry them to the town, they were determined to sally out into the Turkish camp, where they might fall honourably by the sword, instead of suffering such an ignominious

Malta. death as they had reason to expect if the fort was taken by storm.

To this letter La Valette replied, "That they were much mistaken if they expected to satisfy their honour by throwing away their lives; since it was no less their duty to submit to his authority than to sacrifice their lives in defence of the order: that the preservation of the whole depended on their present obedience to his commands: that no aid was to be expected from Spain if the fort were given up. And that if he should yield to their request, and bring them to the town, the town itself would then be immediately invested; and they, as well as the rest, soon afterwards reduced to a situation more desperate than that from which they were so solicitous to escape, by deserting an important post which they had undertaken to defend." Besides this letter, he sent three commissioners to examine the state of the fortifications; intending by this measure either to gain time or to prevent the garrison from sinking into despair.

These commissioners differed very widely in the accounts which they delivered at their return. Two of them thought it impossible to defend the fort much longer. But the third, named Constantine Castriot, a Greek prince, descended from the famous Albanian hero Scanderbeg, whether from ignorance or a consciousness of greater resources in his native courage than the other two possessed, maintained that the garrison was far from being reduced to the last extremity; and to give a proof how firmly he was persuaded of the truth of what he said, he offered to enter the fort himself, and to undertake the defence of it with such troops as should be willing to accompany him.

The grand master, strongly impressed with a sense of the necessity of protracting the siege, immediately accepted this offer, and bestowed the highest encomiums on Castriot's zeal and resolution. Nor did Castriot find any difficulty in persuading a sufficient number to attend him, who were no less zealous and resolute than himself. The soldiers crowded to his standard, and were emulous to have their names enrolled for that dangerous service in which he had engaged.

When La Valette saw the spirit by which these men were animated, and had no longer any doubt of being able by their means to prolong the siege of the fort; he sent a letter to the knights, acquainting them, that he was now willing to give them their discharge; and would immediately send another garrison, into whose hands he desired they should be ready to deliver up the fort, and come themselves to the town in the boats in which their successors were to be transported.

The contents and style of this letter affected the knights in the most sensible manner, and roused within them that delicate sense of honour by which the order had been so long and so eminently distinguished. —They resolved without hesitation to remain in the fort till every man should perish, rather than either deliver it to the new garrison or abandon it to the enemy. And they went in a body to the governor, and intreated him to inform the grand master of their repentance, and to join with them in praying that they might be suffered to wipe out the remembrance of their fault by their future conduct.

The grand master suffered himself at last to be overcome; and henceforth the garrison were intent on nothing but how to prolong the defence. Malta.

The grand master sent them every night fresh troops to supply the place of the killed and wounded; and kept them well furnished with provisions, ammunition, and fireworks. Of these last he had invented a particular kind, which consisted of hoops of wood, covered with wool, and steeped in boiling oil and other inflammable liquors, mixed with nitre and gunpowder. To these machines they set fire, and threw them flaming in the midst of the enemy when they were crowded together at an assault. It happened often that two or three of the Turks were hooked together and scorched to death; and the utmost confusion was produced wherever they were thrown. 12 Invention of burning hoops.

The besieged stood much in need of this, and every other instrument of mischief that could be devised, for their defence. In spite of the most vigorous opposition, the Turks had cast a bridge over the ditch, and begun to sap and undermine the wall. From the 17th of June to the 14th of July, not a single day passed without some rencounter; and Mustapha had frequently attempted to scale the wall of the fort, but had been as often repulsed with the loss of some of the bravest of his troops.

Ashamed at having been detained so long before a place of such inconsiderable strength, he resolved to make one great decisive effort; and to bring to the assault as many of his forces as the situation of the place would permit him to employ. He had already made several breaches; but in order to secure the success of the assault which he now intended, he kept his batteries playing all the 15th without intermission, till the wall on that side where he designed his attack was almost level with the rock. On the 16th, the fleet was drawn up before sunrise, as near the fort as the depth of the water would allow. Four thousand musketeers and archers were stationed in the trenches; and the rest of the troops, upon a signal given, advanced to the breach. The garrison was prepared to receive them; the breach was lined with several ranks of soldiers, having the knights interspersed among them at certain distances. The Turks attempted often to break through this determined band, and to overpower them with their numbers; but their numbers served only to augment the loss which they sustained. Every shot from the fort did execution. The artillery made dreadful havock among them: and the burning hoops were employed with astonishing success. The novelty of these machines, and the shrieks of those who were caught in them, added greatly to the terror which they inspired; and made it impossible for the Turkish officers to keep their men firm and steady in pursuing the advantages, which, had they preserved their ranks, their numbers must have infallibly acquired.

At length Mustapha, after a fruitless assault of more than six hours, gave orders for sounding a retreat. In this attack the garrison lost about 20 knights and 300 soldiers; but this loss was immediately supplied by a reinforcement from the town; and Mustapha was at last convinced, that, unless the communication between the fort and the town were cut off, it would be impossible to bring the siege of the former to a period, while

any

Malta. any troops remained in the other parts of the island. By the advice of Dragut, he resolved to extend his trenches and batteries on the side next the town, till they should reach to that part of the sea, or great harbour, where those supplies were landed which the grand master daily sent to the garrison. This undertaking he knew must be attended with the utmost difficulty, because all the space between his intrenchments, and the point to which it was necessary to extend them, lay exposed to the artillery both of Fort St Elmo and St Angelo. In viewing the ground, a Sangiac, in whom he put confidence, was killed by his side; and, which was still a more irreparable loss, Dragut received a mortal wound, of which he died in a few days. This did not, however, discourage Mustapha from pursuing his design. By employing his troops and pioneers at the work day and night, without intermission, he at length carried it into execution. Then having planted batteries along the shore, and filled his trenches with musketeers, it was impossible for any boat to pass from the town to the fort without the most imminent danger of either being sunk or intercepted.

After this precaution, he resumed with fresh vigour his attempts to take the fort by storm. On the 21st he made four different assaults: all of which the garrison withstood; and, in repulsing so many thousand brave and well disciplined troops, displayed a degree of prowess and fortitude which almost exceeds belief, and is beyond the power of description. But this heroic garrison was now exceedingly reduced in number; and there was the strongest reason to apprehend, that, in one assault more, they must inevitably be overpowered, unless a reinforcement were sent them from the town. Of their desperate situation they gave intelligence to the grand master by one who swam across the harbour in the night. The boats were instantly filled with knights and other soldiers, who generously resolved to devote themselves to certain destruction for the general safety, and the preservation of the fort. They set off from the town with as much alacrity as if they had entertained the most sanguine hopes of victory; but they found the Turks everywhere so much upon their guard, and the lines so strongly defended, that, after several fruitless attempts to land, they were at last obliged to return, depressed with sorrow for the fate of their brave companions.

The garrison now gave themselves up for lost; but instead of either capitulating or attempting to escape, they prepared for death, and passed the night in prayer and in receiving the sacrament; after which they embraced one another tenderly, and then repaired to their respective posts; while such of the wounded as had been disabled from walking, were, at their own earnest desire, carried to the side of the breach, where they waited, without dismay, for the approach of the Turkish army.

Early in the morning of the 23d of July, the Turks advanced to the assault with loud shouts, as to certain victory, which they believed so a small a handful of men as now remained in the fort would not dare to dispute with them. In this expectation they were disappointed. The garrison being resolved on death, and despising danger were more than men, and exerted a degree of prowess and valour that filled their enemies with amazement. The combat lasted upwards of four hours, till not only every knight but every soldier had fallen, except two or three who had saved themselves by swimming. The Turkish colours were then planted on the ramparts; and the fleet entered the harbour, which the fort commanded, in a kind of triumph. When Mustapha took a view of the fort, and examined its size and fortifications, he could not refrain from saying, "What will not the father cost us (meaning the town), when the son, who is so small, has cost so many thousands of our bravest troops?" But this reflection, far from exciting his admiration of that heroic fortitude which he had found so difficult to overcome, served only to inspire him with a brutal fury. He ordered all such of the garrison as were found lying on the breach alive to be ripped open, and their hearts torn out; and, as an insult on the knights and their religion, he caused their dead bodies to be searched for, and large gashes to be made in them, in the form of a cross; after which he tied them on planks, and threw them into the sea, to be carried by the wind and tide to the town or Fort St Angelo.

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13 The fort taken, and the garrison cut off.

14 Cruelty of Mustapha.

The grand master was at first melted into tears at this shocking spectacle; but his grief was soon converted into indignation and revenge: and these passions betrayed him into an action unworthy of the exalted character which he bore. In order to teach the basha, as he pretended, to make war with less barbarity, he caused all the Turks whom he had taken prisoners to be massacred; and then putting their heads into his largest cannon, he shot them into the Turkish camp.

15 And of the grand master.

In the siege which has been related, the order lost about 1500 men, including 130 of the bravest knights.

Mustapha vainly imagined, that, being intimidated by the fate of their companions, they would be now inclined to listen to terms of capitulation: and in this hope, he sent an officer with a white flag to one of the gates, attended by a Christian slave designed to serve for his interpreter. The Turk was not allowed to enter within the town; but the Christian was admitted, and was led through several ranks of soldiers under arms, by an officer, who, after showing him all the fortifications of the place, desired him to take particular notice of the depth and breadth of the ditch, and said to him, "See there, the only spot we can afford your general; and there we hope soon to bury him and all his janizaries."

This insulting speech being reported by the slave, excited in the fiery mind of the basha the highest degree of wrath and indignation, and made him resolve to exert himself to the utmost in the prosecution of the siege. His troops, though greatly diminished, were still sufficient to invest at once both the town and the fort of St Michael. He kept a constant fire on both; but he intended first to apply to the reduction of the latter, which he proposed to attack both by land and water, at the extremity of the peninsula on which it stands. In order to accomplish this design, it was necessary he should have some shipping introduced into the harbour for transporting his forces. But the mouth of the harbour having been rendered inaccessible by a great iron chain and the cannon of St Angelo, his design must have been relinquished, if Piali had not suggested an expedient against which the grand master had not provided. This was, to make

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make the Christian slaves and the crews of the ships draw a number of boats, by the strength of their arms, over the neck of land on which stood Fort St Elmo. Of this proposal, which Mustapha immediately adopted, information was carried to the grand master by a Turkish officer; who, being by birth a Greek, was touched suddenly with remorse, and deserted to the Christians. In consequence of this intelligence, La Valette set a great number of hands to work in framing a staccado along that part of the promontory where the Turks intended their attack; and at another part, where the depth of the water or the hardness of the bottom would not admit the staccado, he caused strong intrenchments to be made upon the beach. Mustapha, in the mean time, fired incessantly upon the fort, while the slaves and crews were employed in transporting the boats over land into the harbour. At length the basha, judging that the number of boats which he had transported would be sufficient, and that the breaches which his artillery had made were practicable, resolved, without further delay, to make an attack both by sea and land. He was the more confident of success, as since the taking of St Elmo, he had received a considerable reinforcement, by the arrival of Hasem, son of Barbarossa, with 2500 select soldiers, commonly called *the Bravoes of Algiers*. Hasem, who possessed a considerable share of his father's fire, and was ambitious to distinguish himself in the sultan's service, begged of Mustapha to instrust him with the assault of Fort St Michael; and vaunted, with his natural arrogance, that he would soon make himself master of it sword-in-hand. The basha, whether from an opinion of his valour, or an intention to make him learn at his own expence the folly of his presumption, readily complied with his request; and, having added 6000 men to his Algerines, he promised to support him with the rest of his army.

Hascem divided his forces with Candelissa, an old corsair, his lieutenant; to whom he committed the attack by sea, whilst he reserved that on the land-side to himself.

Candelissa having put his troops on board the boats, set out with drums beating, and hautboys and other musical instruments playing, preceded by a boat filled with Mahometan priests, some of whom were employed in offering prayers to heaven for his success, or in singing hymns; while others had books in their hands, out of which they read imprecations against the Christians. Candelissa attempted first to break down the staccado which had been formed to obstruct his landing; but finding it much stronger than he expected, and that, while he was employed in demolishing it, his troops must suffer greatly from the enemy's fire, he thought it would be easier to make a descent on that part of the shore which the grand master had strengthened with intrenchments. At this important post, the

16 The Turks repulsed with great slaughter.

Christian troops were commanded by an ancient knight of the name of *Guimeran*. This experienced officer reserved his fire till the Turks had advanced within a little distance of the shore, when, by a single discharge, he killed about 400 men. This did not prevent the rest from approaching. Candelissa pushed forwards while the Christians were loading their cannon, and landed at the head of his Algerines. But Guimeran having reserved some cannon charged with grape-shot, did dreadful execution among them after they had landed, and many of them began to fly to their boats: which Candelissa observing, he commanded the boats to be put off to a little distance from the shore. His troops, perceiving then that they must either die or conquer, took courage from despair, and advanced boldly to the intrenchment, with ladders for scaling it in one hand and their sabres in the other. The combatants on both sides displayed the most intrepid valour. Great numbers fell, and the ditch was choked with blood, and with the bodies of the dead and wounded. The Turks at last, after an engagement, of five hours, reached the top of the intrenchment and there planted their ensigns. The knights, stung with shame on account of their retreat, returned with redoubled ardour. But they would probably have been overpowered by the superior number of the enemy, had not the grand master sent them a seasonable reinforcement, under the admiral de Giou and the Chavalier de Quiney; who fell upon the Algerines and Turks with a degree of fury that struck terror into Candelissa himself, who was noted for his intrepidity. Having ordered the boats to be brought nearer the shore, he was among the first who fled. His bravoes fought desperately for some time after he had left them; but they were at length thrown down from the intrenchments, and compelled to fly to their boats with the utmost precipitation. The Christians pursued them, and the batteries continued firing on them without intermission. Many of the boats were sunk; the water was covered with dead bodies, mangled limbs, shields, and helmets. Of the 4000 who had been sent on this enterprise, scarcely 500 remained, and many of these were dangerously wounded.

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Hascem was not more fortunate in his assault by land than Candelissa was by sea. After having been repulsed at one breach with great slaughter, he rallied his troops, and led them on to another, where he fought long and desperately, till, most of the bravoes having fallen by his side, he was obliged, with much reluctance and sorrow, to sound a retreat.

Mustapha, not unmindful of his promise to support him, no sooner perceived him beginning to retire, than he ordered the janizaries, whom he kept under arms, to advance. The garrison had maintained an engagement with Hascem for five hours, in the middle of the day, and in the hottest season of the year; yet, as if they had not been subject to the wants and weaknesses of humanity, they advanced beyond the breach to meet the janizaries, and fought apparently with as much vigour and fortitude as before. By the power of superior numbers, they were compelled to fall back within the breach. But there they made the most desperate resistance; and, being reinforced by De Giou and De Quiney, with the troops which had triumphed over Candelissa, they at last repulsed the janizaries with dreadful slaughter; after having lost more than 40 knights, and 200 of the bravest of the common men.

17 Incredible valour of the Maltese.

Mustapha, enraged by this invincible obstinacy which the Christians displayed in their defence, and dreading that the Spanish succours, which had been already delayed much longer than he expected, might soon arrive, resolved now to employ his whole force at once; and

Malta. and while he himself prosecuted the siege of Fort St Michael with one half of his troops, to employ the other, under Piali, against the town. More batteries were raised; the trenches were advanced still nearer than before; bridges of sail-yards and masts were thrown over the ditches; mines, notwithstanding the hard and rocky soil, were sprung; assaults were repeated without number; and the two bashas, emulous of one another, and each of them agitated with continual anxiety lest victory should declare first for his competitor, exhibited the most shining proofs of personal courage, and exhausted all the art of war then known in the world. Yet, through the determined bravery of the knights, conducted by the grand master with consummate prudence and indefatigable vigilance, the Turks were baffled in every attempt, and repulsed with slaughter. Mustapha flattered himself once with the most sanguine hopes of success on his part, from a machine invented by his principal engineer, in the form of a huge cask bound strongly with iron hoops, and filled with gunpowder, nails, chains, bullets, and such other instruments of death. After setting fire to a train which was fastened to this machine, it was thrown, by the force of an engine, upon a ravelin that was the principal defence of the fort. But the garrison, undismayed, found means, before it caught fire, to cast it out again into the midst of the assailants. In a moment afterwards it burst with dreadful fury, and filled the Turks with consternation. The knights then sallied out upon them sword in hand; and, taking advantage of their confusion, killed many of them, and put the rest to flight.

18 A great number of Turks destroyed by a contrivance of their own.

Piali had, on some occasions, still more reason than Mustapha to entertain the hopes of victory, although the town was much stronger than the fort, and La Valette commanded there in person. By his batteries he had demolished all the outworks of the place, and had made an immense breach in the wall. While his troops were engaged in a furious assault, that engrossed the whole attention of the besieged from morning till night, he employed a great number of pioneers in raising a cavalier or platform of earth and stones, close by the breach, and so high as to overlook the parapet. Night, in the mean time, came on, and prevented him from carrying any further this great advantage; but he doubted not that next day he should be able to make himself master of the place.

19 The grand master prevents the knights from abandoning the town.

As soon as he had drawn off his forces, a council of the order was convened, and most of the knights were of opinion that the town was no longer tenable; that the fortifications which still remained should be blown up; and that the garrison and inhabitants should retire into the castle of St Angelo. But the grand master received this proposal with horror and indignation. "This would be in effect (said he), to deliver the whole island into the hands of the infidels. Fort St Michael, which has been so gallantly defended, and which is preserved by its communication with the town, would thus be soon reduced to the necessity of surrendering. There is no room in the castle of St Angelo for the inhabitants and troops; nor, if there were room, is there water in that fort for so great a number." It was then proposed, that at least the relics of the saints and the ornaments of the churches should be carried into the castle; and the knights earnestly entreated the grand master to retire into it himself, assuring him that they would conduct the defence with the utmost vigour and vigilance. "No, my brethren (he replied), what you propose as to the sacred things would serve only to intimidate the soldiers. We must conceal our apprehensions. It is here we must either die or conquer. And is it possible that I, at the age of 71, can end my life so honourably as in fighting, together with my friends and brethren, against the implacable enemies of our holy faith?" He then told them what he thought proper to be done, and proceeded instantly to put it into execution. Having called all the soldiers from Fort St Angelo, except a few who were necessary for managing the artillery, he employed them and the inhabitants all night in throwing up intrenchments within the breach; after which he sent out some of the bravest knights, with a select body of troops, to make an attempt on the cavalier. These men stole softly along the foot of the wall till they arrived at the place appointed; when they set up a loud shout, and attacked the guards whom Piali had left there with so much fury, that the Turks, believing the whole garrison had fallen upon them, abandoned their post, and fled precipitately to their camp. Malta.

The cavalier was immediately fortified, a battery of cannon planted on it, and a parapet raised on the side towards the enemy. And thus the breach was rendered impracticable; the town put in greater security than before; and a work, which had been devised for its destruction, converted into a bulwark for its defence.

The grand master had now greater confidence than ever of being able to hold out till the Spaniards should come to his relief. In consequence of the assurances given by Philip and the Sicilian viceroy, he had, long before this time, entertained the hopes of their arrival; and had often earnestly solicited the viceroy to hasten his departure from Messina. The conduct of this nobleman was long exceedingly mysterious. The patience of the knights was worn out by his delays; and they, and many others, suspected that the real motives of his conduct was the dread of encountering with an admiral of so considerable reputation as Piali. But it afterwards appeared that the viceroy had acted agreeably to his instructions from the court of Spain. For although Philip was, for the reasons above mentioned, sincerely interested in the preservation of the knights, and had amused them with the most flattering promises of assistance; yet he seems from the first to have resolved not to expose himself to danger on that account, and to avoid, if possible, a general engagement.

Philip was affected by their danger only so far as it threatened the tranquillity of his own dominions. He had resolved to interpose in their behalf, rather than suffer them to be overpowered; but he appears to have been very little touched with their calamities, and to have intended to leave them to themselves, as long as there was any prospect of their being able to make resistance; by doing which he considered, that he would not only preserve his own strength entire, but might afterwards engage with the Turks, when they were exhausted by the operations of the siege.

Philip adhered inflexibly to this plan, notwithstanding the grand master's repeated importunities, much longer than was consistent with his own selfish views. For, without

Malta. without a degree of fortitude and prowess on the part of the garrison, and a degree of wisdom, vigilance, and magnanimity on that of the grand master, infinitely higher than there could be reason to expect, it must have been impossible for such a handful of men to have withstood, for so long a time, so great a force, and such mighty efforts, as were employed to reduce them. Even the death of the grand master alone, whose person was exposed to perpetual danger, would have proved fatal to the knights, long before Philip sent orders to his viceroy to give them any effectual support; and in this case, as his own dominions or his fleet would have been immediately attacked, he would probably have had little reason to be satisfied with the timid ungenerous counsels which he pursued.

Whatever judgment may be formed on this head, the viceroy did not think himself at liberty to yield to the repeated applications of the grand master, till the operations of the siege began to relax, and the Turkish forces were reduced from 45,000 to 15,000 or 16,000; of whom many were worn out with the fatigues which they had undergone, and others rendered unfit for action by a bloody flux, which for several weeks had raged amongst them.

In this situation of affairs, when it was probable that the knights would, without assistance, have compelled the Turks to raise the siege, the viceroy let the grand master know, that he had now received such instructions from the king, as put it in his power to show his attachment to the order: that he was not indeed permitted to attack the Turkish fleet; but that he would immediately bring him a strong body of troops, whose commanders (as he himself must return to Sicily) were to be entirely subject to the grand master's authority till the enemy should be expelled.

20 The knights receive a reinforcement.

The viceroy, although still suspected of interposing unnecessary delays, at length fulfilled his promise; and on the 7th of September landed 6000 men, under Don Alvaro de Sandé and Ascanio della Corna, in that part of the island which lay at the greatest distance from the Turks; after which, he immediately carried back the fleet to Sicily.

In the mean time, intelligence being brought to Mustapha that the Spaniards were landed, and marching towards him, he was thrown into the most dreadful consternation. Sensible that his soldiers were much disheartened by their ill success, he imagined that he was about to be attacked by a superior army, consisting of the bravest and best disciplined troops in Spain. Without waiting for information of their number, he

21 The Turks raise the siege in a panic.

forthwith raised the siege, drew his garrison out of St Elmo, and, leaving all his heavy cannon behind him, embarked his troops with as much precipitation as if the Spaniards with superior forces had been in sight. He had scarcely got on board when a deserter arrived from the Spanish camp, and informed him, that with 15,000 or 16,000 men, he had fled before an army that did not exceed 6000, having no general at their head, and commanded by officers who were independent of one another. The basha was overwhelmed with shame and vexation by this intelligence, and would have immediately disembarked; but this, he knew, he durst not attempt without consulting Piali, Hassem, and his other principal officers.

While he was deliberating upon it, the grand master improved to the best advantage the leisure that was afforded him. He employed all the inhabitants, men, women, and children, as well as the soldiers, in filling up the enemy's trenches, and demolishing their works; and put a garrison without delay into Fort St Elmo; in which the Turks now beheld from their ships the standard of St John erected, where that of Mahomet had lately stood. Malta.

This demonstrated to Mustapha how much new labour awaited him in case he should return to the siege; but being enraged against himself on account of the precipitancy of his retreat, and disquieted at the thoughts of the reception which he had reason to expect from Solyman, he wished to atone for his imprudence, and to wipe off the reproach in which it had involved him, by victory or death. Piali, who, from his jealousy of the basha's credit with the sultan, was not sorry for the failure of his enterprise, represented in a council of war convened on this occasion, That as the troops were much dispirited and worn out, it would be exposing them to certain destruction, either to lead them against the enemy, or to resume the operations of the siege. But the majority of the council were of a different opinion; and it was resolved to land the forces again without delay.

22 They return, but are defeated.

The Turkish soldiers complained bitterly of this unexpected resolution, and obeyed the orders to disembark with the greatest reluctance. Their officers were obliged to employ threats with some, and force with others. At length the number intended was put on shore, and Mustapha set out at their head in search of the enemy.

The grand master had not neglected to give early notice of their march to the Spanish commanders, who had intrenched their little army on a steep hill, which the Turks would have found almost inaccessible; and it was the opinion of some of the principal officers, that they should avail themselves of the advantage of their situation, and stand on their defence. But this proposal was rejected with disdain by the bold adventurous De Sandé, and the greatest part of the Spanish officers; and the troops were led out of their encampment, to meet the enemy in the open field. This conduct, more fortunate perhaps than prudent, contributed to increase the dejection of the Turkish soldiers, and to facilitate their defeat. Having been dragged against their inclination to the field of battle, and being attacked by the Spaniards with great fury, both in front and flank, they scarcely fought, but, being struck with a sudden panic, fled with the utmost precipitation.

Mustapha, confounded and enraged by this pusillanimous behaviour of his troops, was hurried along by the violent tide of the fugitives. He fell twice from his horse, and would have been taken prisoner if his officers had not rescued him. The Spaniards pursued briskly till they came to the sea shore. There Piali had his boats ready to receive the Turks, and a number of shallops filled with musketeers drawn up to favour their escape. Without this precaution, they must all have perished; and, even notwithstanding the protection which it afforded them, the number of their killed amounted to 2000 men, while the victors lost only 13 or 14 at most.

Such, after four months continuance, was the conclusion

Malta. clusion of the siege of Malta, which will be for ever memorable on account of that extraordinary display of the most generous and heroic valour, by which the knights, so few in number, were enabled to baffle the most vigorous efforts which could be made to subdue them by the most powerful monarch in the world. The news of their deliverance gave universal joy to the Christian powers; and the name of the grand master excited everywhere the highest admiration and applause. Congratulations were sent him from every quarter; and in many states public rejoicings were celebrated on account of his success.

With this siege is concluded every thing of importance in the history of Malta. The power of the Turks began about this time to be so much circumscribed, that they ceased to be formidable to the Christian nations, and the knights of Malta had no longer an opportunity of exerting their valour as formerly. The best description of Malta we have met with is that given by Mr Brydone.

23 Description of the island, &c. "The approach of the island (says he), is very fine, although the shore is rather low and rocky. It is everywhere made inaccessible to an enemy by an infinite number of fortifications. The rock, in many places, has been sloped into the form of a glacis, with strong parapets and intrenchments running behind it.—On getting ashore we found ourselves in a new world indeed—the streets (of Valetta) crowded with well-dressed people, who have all the appearance of health and affluence; and we were conducted by the English consul to an inn, which had more the appearance of a palace.

"After dinner we went to visit the principal villas of the island; particularly those of the grand master and the general of the galleys, which lie contiguous to one another. These are nothing great or magnificent; but they are admirably contrived for a hot climate, where, of all things, shade is the most desirable. The orange groves are indeed very fine, and the fruit they bear superior to any thing of the kind in Spain or Portugal.

"The aspect of the country is far from being pleasing: the whole island is a great rock of very white freestone; and the soil that covers this rock is, in most places, not more than five or six inches deep; yet, what is singular, we found their crop in general was exceedingly abundant. They account for it from the copious dews that fall during the spring and summer months: and pretend likewise that there is a moisture in the rock below the soil, that is of great advantage to the corn and cotton, keeping its roots perpetually moist and cool; without which singular quality, they say, they could have no crop at all, the heat of the sun being so exceedingly violent.—The whole island produces corn only sufficient to supply its inhabitants for five months or little more; but the crop they most depend upon is the cotton. They begin to sow it about the middle of May, and continue till the middle of June; and the time of reaping is in the month of October and beginning of November.

"They pretend that the cotton produced from this plant, which is sown and reaped in four months, is of a much superior quality to that of the cotton-tree. I compared them; but I cannot say I found it so: this is indeed the finest; but that of the cotton-tree is by much the strongest texture. The plant rises to the height of a foot and a half; and is covered with a number of nuts or pods full of cotton: These, when ripe, they are at great pains to cut off every morning before sunrise; for the heat of the sun immediately turns the cotton yellow: which indeed we saw from those pods they save for seed. Malta.

"They manufacture their cotton into a great variety of stuffs. Their stockings are exceedingly fine. Some of them, they assured us, had been sold for ten sequins a pair. Their coverlets and blankets are esteemed all over Europe. Of these the principal manufactures are established in the little island of Gozzo, where the people are said to be more industrious than those of Malta, as they are more excluded from the world, and have fewer inducements to idleness. Here the sugar cane is still cultivated with success, though not in any considerable quantity.

"The Maltese oranges certainly deserve the character they have of being the finest in the world. The season continues for upwards of seven months, from November till the middle of June; during which time those beautiful trees are always covered with abundance of delicious fruit. Many of them are of the red kind, much superior, in my opinion, to the others, which are rather too luscious. They are produced, I am told, from the common orange bud, ingrafted on the pomegranate stock. The juice of this fruit is as red as blood, and of a fine flavour. The greatest part of their crop is sent in presents to the different courts of Europe, and to the relations of the chevaliers.

"The industry of the Maltese in cultivating their little island is inconceivable. There is not an inch of ground lost in any part of it; and where there was not soil enough, they have brought over ships and boats loaded with it from Sicily, where there is plenty, and to spare. The whole island is full of enclosures of freestone, which give the country a very uncouth and barren aspect; and in summer reflect such a light and heat, that it is exceedingly disagreeable and offensive to the eyes. The enclosures are very small and irregular, according to the inclination of the ground. This, they say, they are obliged to observe, notwithstanding the deformity it occasions; otherwise the floods, to which they are subject, would soon carry off their soil.

"The island is covered over with country houses and villages, besides seven cities, for so they term them; but there are only two, the Valetta, and Citta Vecchia, that by any means deserve that appellation. Every little village has a noble church, elegantly finished, and adorned with statues of marble, rich tapestry, and a large quantity of silver plate.

"The city of Valetta has certainly the happiest situation that can be imagined. It stands upon a peninsula between two of the finest ports in the world, which are defended by almost impregnable fortifications. That on the south side of the city is the largest. It runs about two miles into the heart of the island; and is so very deep, and surrounded by such high grounds and fortifications, that they assured us the largest ships of war might ride here in the most stormy weather, almost without a cable.

"This beautiful bason is divided into five distinct harbours,

Malta. harbours, all equally safe, and each capable of containing an immense number of shipping. The mouth of the harbour is scarcely a quarter of a mile broad, and is commanded on each side by batteries that would tear the strongest ship to pieces before she could enter. Besides this, it is fronted by a quadruple battery, one above the other, the largest of which is a *fleur d'eau*, or on a level with the water. These are mounted with about 80 of their heaviest artillery: so that this harbour, I think, may really be considered as impregnable; and indeed the Turks have ever found it so, and I believe ever will.

"The harbour on the north side of the city, although they only use it for fishing, and as a place of quarantine, would, in any other part of the world, be considered as inestimable. It is likewise defended by very strong works; and in the centre of the bason is an island on which they have built a castle and a lazaret.

"The fortifications of Malta are indeed a most stupendous work. All the boasted catacombs of Rome and Naples are a trifle to the immense excavations that have been made in this little island. The ditches, of a vast size, are all cut out of the solid rock. These extend for a great many miles, and raise our astonishment to think that so small a state has ever been able to make them.

"One side of the island is so completely fortified by nature, that there was nothing left for art. The rock is of a great height, and absolutely perpendicular from the sea for several miles. It is very singular, that on this side there are still the vestiges of several ancient roads, with the tracks of carriages worn deep in the rocks. These roads are now terminated by the precipice, with the sea beneath; and show, to a demonstration, that this island has formerly been of a much larger size than it is at present; but the convulsion that occasioned its diminution is probably much beyond the reach of any history or tradition. It has been often observed, notwithstanding the very great distance of Mount Ætna, that this island has generally been more or less affected by its eruptions; and they think it probable, that on some of these occasions a great part of it may have been shaken into the sea.

"One half of Mount Ætna is clearly discovered from Malta. They reckon the distance near 200 Italian miles. And the people of Malta affirm, that, in great eruptions of the mountain, their whole island is illuminated, and from the reflection in the water there appears a great track of fire all the way from Malta to Sicily. The thundering of the mountain is likewise distinctly heard.

"We made an expedition through the island in coaches drawn by one mule each; the only kind of vehicle the island affords. The catacombs, not far from the ancient city of Melita, are a great work; they are said to extend for 15 miles under ground. Many people, they assure us, have been lost in them by advancing too far; the prodigious number of branches making it next to impossible to find the way out again. The great source of water that supplies the city of Valetta takes its rise near to this place; and there is an aqueduct, composed of some thousand arches, that conveys it from thence to the city. The whole of this immense work was finished at the private expence of Malta. one of the grand masters.

"Not far from the old city there is a small church dedicated to St Paul; and just by the church a miraculous statue of the saint, with a viper on his hand; supposed to be placed on the very spot where the house stood in which he was received after his shipwreck on the island, and where he shook the viper off his hand into the fire without being hurt by it: at which time the Maltese assure us, the saint cursed all the venomous animals of the island, and banished them for ever. Whether this be the cause of it or not, the fact is certain that there are no venomous animals in Malta. They assured us that vipers had been brought from Sicily, and died almost immediately on their arrival.

"Adjoining to the church is the celebrated grotto in which the saint was imprisoned. It is looked upon with the utmost reverence and veneration; and if the stories they tell of it be true, it is well entitled to it all. It is exceedingly damp, and produces (I believe by a kind of petrifaction from the water (a whitish kind of stone, which, they assure us, when reduced to powder, is a sovereign remedy in many diseases, and saves the lives of thousands every year. There is not a house in the island that is not provided with it: and they tell us there are many boxes of it sent annually, not only to Sicily and Italy, but likewise to the Levant, and to the East Indies; and (what is considered as a daily standing miracle) notwithstanding this perpetual consumption, it has never been exhausted, nor even sensibly diminished; the saint always taking care to supply them with a fresh quantity the day following. I tasted some of it, and believe it is a very harmless thing. It tastes like exceeding bad magnesia, and, I believe, has pretty much the same effects. They give about a teaspoonful of it to children in the smallpox and in fevers. It produces a copious sweat about an hour after; and, they say, never fails to be of service. It is likewise esteemed a certain remedy against the bite of all venomous animals. There is a very fine statue of St Paul, in the middle of this grotto, to which they ascribe great powers.

"The grand master of the knights of Malta is more absolute, and possesses more power, than most sovereign princes. His titles are, *serene highness* and *eminence*; and his household attendance and court are all very princely. As he has the disposal of all lucrative offices, he makes of his councils what he pleases; besides, in all the councils that compose the jurisdiction of this little nation, he himself presides, and has two votes. He has the disposal of 21 commanderies, and one priory, every five years; and as there is always a number of expectants, he is very much courted. He is chosen by a committee of 21; which committee is nominated by the seven nations, three out of each nation. The election must be over within three days of the death of the former grand master; and, during these three days, there is scarce a soul that sleeps at Malta: all is cabal and intrigue; and most of the knights are masked, to prevent their particular attachments and connections from being known: the moment the election is over, every thing returns to its former channel.

"The land force of Malta is equal to the number of

Malta. of men in the island fit to bear arms. They have about 500 regulars belonging to the ships of war; and 150 compose the guard of the prince. The two islands of Malta and Gozzo contain about 150,000 inhabitants. The men are exceedingly robust and hardy. I have seen them row for 10 or 12 hours without intermission, and without even appearing to be fatigued. Their sea force consists of 4 galleys, 3 galliots, 4 ships of 60 guns, and a frigate of 36, besides a number of the quick-sailing little vessels called *scampavias* (literally *runaways*). Their ships, galleys, and fortifications, are not only well supplied with excellent artillery, but they have likewise invented a kind of ordnance of their own, unknown to all the world besides. For we found, to our no small amazement, that the rocks were not only cut into fortifications, but likewise into artillery, to defend these fortifications, being hollowed out, in many places, into the form of immense mortars. The charge is said to be about a barrel of gunpowder, over which they place a large piece of wood, made exactly to fit the mouth of the chamber. On this they heap a great quantity of cannon-balls, shells, or other deadly materials; and when an enemy's ship approaches the harbour, they fire the whole into the air: and they pretend it produces a very great effect; making a shower for 200 or 300 yards round, that would sink any vessel.

"Notwithstanding the supposed bigotry of the Maltese, the spirit of toleration is so strong, that a mosque has been lately built for their sworn enemies the Turks. Here the poor slaves are allowed to enjoy their religion in peace. It happened lately that some idle boys disturbed them during their service; they were immediatly sent to prison, and severely punished. The police indeed is much better regulated than in the neighbouring countries, and assassinations and robberies are very uncommon; the last of which crimes the grand master punishes with the utmost severity. He is said to be much more relaxed with regard to the first.

"Perhaps Malta is the only country in the world where duelling is permitted by law. As their whole establishment is originally founded on the wild and romantic principles of chivalry, they have ever found it too inconsistent with those principles to abolish duelling; but they have laid it under such restrictions as greatly to lessen its danger. These are curious enough. The duellists are obliged to decide their quarrel in one particular street of the city; and if they presume to fight anywhere else, they are liable to the rigour of the law. But, what is not less singular, but much more in their favour, they are obliged, under the most severe penalties, to put up their swords, when ordered to do so by a *woman*, a *priest*, or a *knight*. Under these limitations, in the midst of a great city, one would imagine it almost impossible that a duel could ever end in blood; however, this is not the case: a cross is always painted opposite to the spot where a knight has been killed, in commemoration of his fall. We counted about 20 of these crosses.

"About three months ago (Mr Brydone's letter is dated June 7. 1770), two knights had a dispute at a billiard table. One of them, after giving a great deal of abusive language, added a blow; but to the astonishment of all Malta (in whose annals there is not a similar instance), after so great a provocation he absolutely refused to fight his antagonist. The challenge was repeated, and he had time to reflect on the consequences; but still he refused to enter the lists. He was condemned to make the *amende honorable* in the great church of St John for 45 days successively; then to be confined in a dungeon, without light, for five years; after which, he is to remain a prisoner in the castle for life. The unfortunate young man who received this blow is likewise in disgrace, as he has not had an opportunity of wiping it out in the blood of his adversary. Malta.

"The horse-races of Malta are of a very uncommon kind. They are performed without either saddle, bridle, whip, or spur; and yet the horses are said to run full speed, and to afford a great deal of diversion. They are accustomed to the ground for some weeks before; and although it is entirely over rock and pavement, there are very seldom any accidents. They have races of asses and mules performed in the same manner four times every year. The rider is only furnished with a machine like a shoemaker's awl, to prick on his courser if he is lazy.

"As Malta is an epitome of all Europe, and an assemblage of the younger brothers, who are commonly the best, of its first families, it is probably one of the best academies for politeness in this part of the globe; besides, where every one is entitled by law as well as custom to demand satisfaction for the least breach of it, people are under a necessity of being very exact and circumspect, both with regard to their words and actions."

Malta was taken by the French army under General Bonaparte, destined to invade Egypt, in the year 1799, but soon after retaken by the British, and agreed to be given up to the knights of St John of Jerusalem, by the treaty of Amiens, in 1802. The British however insisted on retaining it for 10 years; and this formed one cause of the recommencement of hostilities in June 1803. The possession and full sovereignty of this island, was confirmed to Britain by the treaty of Paris in May 1814.

Knights of MALTA, otherwise called *Hospitalers of St John of Jerusalem*, a religious military order, whose residence is in the island of Malta, situated in the Mediterranean sea, upon the coast of Africa. The Knights of Malta, so famous for defending Christendom, had their rise as follows:

Some time before the journey of Godfrey of Bouillon into the Holy Land, some Neapolitan merchants, who traded in the Levant, obtained leave of the caliph of Egypt to build a house for those of their nation who came thither on pilgrimage, upon paying an annual tribute. Afterwards they built two churches, and received the pilgrims with great zeal and charity. This example being followed by others, they founded a church in honour of St John, and an hospital for the sick; whence they took the name of *Hospitalers*. A little after Godfrey of Bouillon had taken Jerusalem, in 1099, they began to be distinguished by black habits and a cross with eight points; and, besides the ordinary vows, they made another, which was to defend the pilgrims against the insults of the infidels. This foundation was completed in 1104, in the reign of Baldwin; and so their order became military, into

Malta

which many persons of quality entered, and changed the name of *hospitalers* into that of *knights*.

When Jerusalem was taken, and the Christians lost their power in the East, the knights retired to Acre or Ptolemais, which they defended valiantly in 1290. Then they followed the king of Cyprus, who gave them Limisson in his dominions, where they staid till 1310. That same year they took Rhodes, under the grand master Foulques de Villaret, a Frenchman; and next year defended it against an army of Saracens: since which the grand masters have used these four letters, F. E. R. T. i. e. *Fortitudo ejus Rhodum tenuit;* and the order was from thence called *knights of Rhodes*.

In 1522, Solyman having taken Rhodes, the knights retired into Candia, and thence into Sicily. In 1530, Charles V. gave them the island of Malta, to cover his kingdom of Sicily from the Turks. In 1566, Solyman besieged Malta; but it was gallantly defended by the grand master John de Valette Parisot, and the Turks obliged to quit the island with great loss.

The knights consisted of eight different languages or nations, of which the English were formerly the sixth; but at present they are but seven, the English having withdrawn themselves. The first is that of Provence, whose chief is grand commendator of religion; the second of Auvergne, whose chief is mareschal of the order; the third of France, whose chief is grand hospitaler; the fourth of Italy, and their chief, admiral; the fifth of Arragon, and their chief, grand conservator; the sixth of Germany, and their chief, grand bailiff of the order; the seventh of Castile, and their chief, grand chancellor. The chief of the English was grand commander of the cavalry.

None are admitted into this order but such as are of noble birth both by father and mother's side for four generations, excepting the natural sons of kings and princes. The knights are of two sorts; those who have a right to be candidates for the dignity of grand master, called *grand crosses;* and those who are only *knights assistants*, who are taken from good families. They never marry; yet have continued from 1090 to the present time.

The order consists of three estates; the knights, chaplains, and servants at arms. There are also priests who officiate in the churches; friar-servants, who assist at the offices; and *donnes* or *demi-crosses;* but these are not reckoned as constituent parts of the body. This division was made in 1130, by the grand master Raimond du Puy.

The government of the order is mixed, being partly monarchical, and partly aristocratical. The grand master is sovereign, coins money, pardons criminals, and gives the places of grand priors, bailiffs, knights, &c. The ordinary council is composed of the grand master and the grand crosses. Every language has several grand priories, and every priory a certain number of commanderies.

The knights are received into this order, either by undergoing the trials prescribed by the statutes, or by dispensations. The dispensations are obtained either by the pope's brief, or by a general chapter of the order, and are granted in case of some defect as to the nobility of their pedigree, especially on the mother's side. The knights are received, either as of age, under minority, or pages to the grand master. They must be 16 years old complete before they are received: they enter into the noviciate at 17, and are professed at 18. They sometimes admit infants of one year old; but the expence is about 4000 livres. The grand master has 16 pages who serve him, from 12 to 16 years of age. The knights wear on the left side of their cloak or waistcoat a cross of white waxed cloth, with eight points, which is their true badge; that of gold being only for ornament. When they go to war against the Turks, they wear a red cassock, with a great white cross before and behind, without points, which are the arms of the religion. The ordinary habit of the grand master is a sort of cassock of tabby-cloth, tied about with a girdle, at which hangs a great purse, to denote the charitable institution of the order. Over this he wears a velvet gown; and on the left side a white cross with eight points. His yearly revenue is 10,000 ducats. He acknowledges the kings of Spain and both the Sicilies, as his protectors; and is obliged by his agreement with the emperor Charles V. to suppress pirates.

Malta || Malvern.

The knights of Malta were deprived of their privileges and had their estates sequestered by order of Maximilian Joseph, elector of Bavaria; but after Paul emperor of Russia took them under his protection, they were all restored. A treaty to this effect was signed in July 1799; but their political existence may now be considered at an end.

MALTON, a town of the north riding of Yorkshire in England, seated on the river Derwent, over which there is a good stone bridge. It is composed of two towns, the New and the Old, and contained 3713 inhabitants in 1811. It is well accommodated with good inns, and sends two members to parliament. W. Long. 0. 40. N. Lat. 54. 8.

MALVA, the MALLOW, a genus of plants belonging to the monadelphia class; and in the natural method ranking under the 37th order, *Columniferæ*. See BOTANY *Index*.

MALVERN, GREAT and LITTLE, (with the *Chase* and the *Hills*); two towns of Worcestershire, in which were formerly two abbeys, about three miles asunder. Since the dissolution nothing remains of the abbey of *Great Malvern* but the gateway of the abbey and church, now parochial. Part of it was a religious cell for hermits before the Conquest; and the greatest part, with the tower, built in the reign of William the Conqueror. Its outward appearance is very striking. It is 171 feet in length, 63 in breadth, and 63 in height. In it are ten stalls; and it is supposed to have been rebuilt in the year 1171. The nave only remains in part, the side aisles being in ruins. The windows have been beautifully enriched with painted glass, and in it are remains of some very ancient monuments. *Little Malvern* stands in a cavity of the hills, which are great lofty mountains, rising like stairs, one higher than another, for about seven miles, and divide this county from Herefordshire. There is a ditch here very much admired. On the hills are two medicinal springs, called *holy wells*, one good for the eyes, and the other for cancers. Henry VII. his queen, and his two sons, Prince Arthur and Prince Henry, were so delighted with this place, that they beautified the church and windows, part of which remain, though mutilated. In the lofty south windows

Malvern || Mambrun.

windows of the church are the historical passages of the Old Testament; and in the north windows the pictures of the holy family, the nativity and circumcision of our Saviour, the adoration of the shepherds and the kings, his presentation in the temple, his baptism, fasting, and temptation, his miracles, his last supper with his disciples, his prayer in the garden, his passion, death, and burial, his descent into hell, his resurrection and ascension, and the coming of the Holy Ghost. The history of our Saviour's passion is painted differently in the east window of the choir, at the expence of Henry VII. whose figure is therefore often represented, as is that of his queen. In the west window is a noble piece of the day of judgment, not inferior to the paintings of Michael Angelo. *Malvern Chase* contains 7115 acres in Worcestershire (besides 241 acres called the Prior's Land), 619 in Herefordshire, and 103 in Gloucestershire. *Malvern Hills* run from north to south, the highest point 1313 feet above the surface of the Severn at Hanley, and appear to be of limestone and quartz. On the summit of these hills is a camp with a triple ditch, imagined to be Roman, and situated on the Herefordshire side of the hills.

MALUS. See PYRUS, BOTANY *Index*.

MAMALUKES, the name of a dynasty that reigned in Egypt. See EGYPT.

MAMBRUN, PETER, an ingenious and learned French Jesuit, born in the diocese of Clermont, in the year 1581. He was one of the most perfect imitators of Virgil in Latin poetry, and his poems are of the same species: Thus he wrote *Eclogues*, *Georgics*, or four books on the culture of the soul and the understanding; together with a heroic poem, entitled *Constantine*, or *Idolatry overthrown*. He showed also great critical abilities in a Latin *Peripatetical Dissertation on Epic Poetry*. He died in 1661.

Mambrun || Mammæ.

MAMERTINI, a mercenary band of soldiers which passed from Campania into Sicily at the request of Agathocles. When they were in the service of Agathocles, they claimed the privilege of voting at the election of magistrates at Syracuse, and had recourse to arms to support their unlawful demands. The sedition was appeased by the authority of some leading men, and the Campanians were ordered to leave Sicily. In their way to the coast they were received with great kindness by the people of Messana, and soon returned perfidy for hospitality. They conspired against the inhabitants, murdered all the males in the city, married their wives and daughters, and rendered themselves masters of the place. After this violence they assumed the name of Mamertini, and called their city Mamertum, or Mamertium, from a provincial word which in their language signified *martial* or *warlike*. The Mamertines were afterwards defeated by Hiero, and totally disabled to repair their ruined affairs.

MAMMÆ, in *Anatomy*. See there, N° 227.

MAMMALIA,

1 Definition.

THE first class of the animal kingdom in the system of Linnæus, containing those animals which have *breasts* or *paps* (*mammæ*), at which they suckle their young. In this class are included, not only what are called the *viviparous quadrupeds*, but the BAT tribe, and several marine animals, as SEALS and WHALES. In the present article, we are to give an account of all but the whales, or CETACEA, which have been already fully treated of under the article CETOLOGY.

INTRODUCTION.

2 Utility of this part of natural history.

The relations that subsist between man and many of the animals arranged in this class, either from their utility as domestic servants, or from the warfare that they carry on against him, his property or his dependants, render the study of this part of natural history peculiarly important; while the extraordinary actions and faculties of some of these animals must make the history of them highly interesting to every one who examines nature with a curious or discerning eye.

3 Our knowledge of it imperfect.

Quadrupeds have, accordingly, engaged the particular attention of naturalists in every country and in every age, and as our acquaintance with them is less difficult than with most other classes of animated nature, it is not surprising that their form, habits, and manners, are most familiar to us. Still, indeed, much remains in doubt respecting some of the foreign and rarer quadrupeds, and of some we know little more than the name. Even with regard to those which have been longest known and described, as the *lion*, the *elephant*, the *porcupine*, &c. the observations of modern naturalists and travellers have corrected several erroneous notions that had been generally received as certain. Long as this part of natural history has occupied the attention of mankind, there yet probably remain many gleanings to repay the industry of future inquirers. It is probable that the unexplored regions of Africa, America, and New Holland, may contain many quadrupeds either entirely unknown to us at present, or known only by the fossil remains that have been discovered in the bowels of the earth. There can, we think, be little doubt that the unicorn exists in Africa, not far north of the Cape of Good Hope, and perhaps, at some distant period it may be as well known as the elephant or the hippopotamus is at present *.

* See *Barrow's Travels in Southern Africa.*

To attempt any thing like a critical examination of even the most celebrated writers on the natural history of the mammalia would far exceed the limits which we are obliged to prescribe to this article. We shall, however, briefly notice some of the more important and more interesting works, to which our readers may refer for information which the nature of this work precludes us from affording them.

4 Writers on mammalia.

Among the ancients, the most celebrated writers on natural history in general, and on quadrupeds in particular, are Aristotle and Pliny, and of these the former has been much more circumstantial, and probably much less credulous than the latter. Aristotle wrote more from observation, and the opportunities of obtaining a knowledge

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knowledge of animals that were afforded him by the liberality of his pupil give him a greater claim to our attention and assent, than is perhaps due to Pliny, who drew his accounts almost entirely from preceding writers. Pliny, however, is a more graceful, more animated, and consequently a more pleasing writer, and everywhere displays great marks of taste and erudition.

5 Aristotle and Pliny.

6 Gesner, Aldrovandus, and Johnston.

Between the subversion of literature and the beginning of the 17th century, there is scarcely a writer on quadrupeds that deserves particular mention. Even during the 17th century, the labourers in this department were few; and the names of Gesner, Aldrovandus, and Johnston, alone have been deemed worthy of commemoration in Linnæus's introduction to the mammalia, and of these it is by no means certain that the writings on quadrupeds attributed to Aldrovandus are genuine.

The 18th century produced a great many valuable works, both systematic and descriptive, on this part of natural history. As systematic writers, Ray and Pennant, and on the continent, Klein, Stort, Brisson, Linnè, Daubenton, and Cuvier, are the most celebrated, and we shall presently notice some of these more at large. As a descriptive writer, Pennant is also conspicuous; and the histories of quadrupeds contained in his "British Zoology" and "Arctic Zoology," are at once accurate and interesting, amusing and instructive. But of all those naturalists who have professed to give a detailed account of the history of quadrupeds, none have acquired such celebrity as the Count de Buffon, whose work is in every one's hands, and has been translated into most of the modern languages. For animated and lively descriptions, and acute and brilliant remarks, Buffon is perhaps unrivalled: method he seems to have despised; and it is to be regretted that his judgment is not always equal to his taste, and that his accuracy is sometimes less conspicuous than his genius and fancy. There are also a certain freedom of expression, and luxuriousness of description, in treating of certain subjects, which render Buffon's work less proper for young people than for those who are more advanced both in years and in the study of nature. Dr Goldsmith's "History of the Earth and Animated Nature" is chiefly an abridgement of Buffon.

7 Pennant.

8 Buffon.

Mr Bewick's "General History of Quadrupeds," with wooden cuts, deserves much praise. In his descriptions, he has selected with much skill and taste, and has added many original and judicious observations, especially respecting the domestic and indigenous animals of this country. His figures are in general excellent, and his vignettes both useful and entertaining.

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9 Bewick.

10 Shaw.

Among the latest systematic works written on this subject is the elegant and splendid "General Zoology" of Dr Shaw. As a museum for acquiring a knowledge of the form and external structure of animals, this work has been surpassed by none, and equalled by very few. Description of the habits or manners of the animals seems to have been a secondary object with Dr Shaw, as of this his work contains very little. It is chiefly valuable as a *systematic arrangement* and general *museum*.

11 Bingley.

We have seen few works more entertaining than Mr Bingley's "*Animal Biography*." It is professedly a compilation, but the extracts are well chosen, and in general highly interesting. We cannot say, however, that they are always happily arranged. As Mr Bingley uniformly quotes his authorities, and has given a list of many valuable works from which he has drawn his information, his work is very useful, and forms an admirable companion to Dr Shaw's Zoology.

In the following account of the mammalia, we shall endeavour to combine amusement with utility; but, as our limits are exceedingly confined, we can give a detailed account of very few species. We shall therefore select the most interesting individuals, referring here generally to Buffon, Pennant, Bewick, Shaw, and Bingley for the rest.

With respect to the general divisions of quadrupeds and the terms employed in describing them, we need say nothing here; the former will be seen from the several classifications to be immediately mentioned, and the latter explained under their proper heads in the general alphabet of this dictionary. Respecting the general anatomical structure of the mammalia, we could add little to what has been already given under *Comparative* ANATOMY. When there occurs any striking peculiarity of conformation in particular individuals, it will be noticed in its proper place.

PART I. CLASSIFICATION OF THE MAMMALIA.

QUADRUPEDS have been very differently classified by different naturalists. Our limits will permit us only to give a brief sketch of some of the more important arrangements, and we shall select those of Linnæus, Pennant, and Cuvier.

12 Classification of Linnæus.

Linnæus divides the mammalia into seven orders, the distinctive characters of which are chiefly derived from the number, situation, and structure of the teeth.

ORDER I. PRIMATES.

This order is intended to contain man and those animals which are most nearly allied to him in their structure. They have usually four cutting teeth in the fore part of each jaw, and in the upper jaw these are parallel; and they have one canine tooth on each side of these in each jaw. They have also two breasts or teats, from which this class derives its name. The two fore feet in many of the individuals resemble the hands of the human species, and are employed for the same purposes, having fingers, furnished for the most part with oval flattened nails. They chiefly live on vegetable food. Under this order Linnæus ranks four genera, viz. man, the ape tribe, the lemur tribe, and the bats.

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Order II. BRUTA.

These have no front teeth in either jaw; their feet are armed with strong blunt nails like hoofs; they are generally of a clumsy form, and slow in their movements; they feed chiefly upon vegetables. This order contains nine genera, of which the principal are the rhinoceros, the elephant, the sloths, and ant-eaters.

Order III. FERÆ.

These have commonly six front teeth in the upper and under jaw, which are somewhat of a conical shape, and next to these strong and sharp canine teeth, with grinders that terminate in conical pointed eminences; their feet are divided into toes which are armed with sharp crooked claws. Almost all the animals of this order are beasts of prey, living chiefly on the flesh of other animals. The order comprehends ten genera, the most remarkable of which are, the seal, dog, cat, weazel, and bear tribes.

Order IV. GLIRES.

These have two front teeth in each jaw, and these are remarkably long and large, but they have no canine teeth; their feet are furnished with claws, and appear formed both for running and leaping. Their food consists of vegetables. This order also contains ten genera, the principal of which are the porcupines, beavers, rats, squirrels, and hares.

Order V. PECORA.

These have several front teeth that are blunt, and have a wedge-like form, in the lower jaw, but no front teeth in the upper; their feet are armed with cloven hoofs; they have four stomachs, feed entirely on vegetables, and ruminate or chew the cud. There are in this order eight genera, comprehending the camel, the musk animal, the giraffe, and the deer, antelope, goat, sheep, and ox tribes.

Order VI. BELLUÆ.

These have front teeth in both jaws that are obtuse; their feet are armed with hoofs that are in some species entire, and in others subdivided. Most of them live entirely on vegetable food. There are four genera, comprising those of the horse, hippopotamus, tapir, and hog.

Order VII. The last order is that of the Cetæ, or *Whales*; for which, see Cetology.

13 Objections to Linnæus's arrangement.

Several objections have been made to the above arrangement of Linnæus, and some of them appear to be sufficiently valid. It has been objected with great reason, that man, the lord of the creation, is degraded by being placed under the same division with apes, monkeys, macaucos and bats, the companions which Linnæus has thought proper to allot to him. However nearly the apes may resemble man in their general appearance, and the macaucos in the use of their fore extremities, they should surely have been considered apart from man; and nothing, it is said, can be more absurd than to arrange the insignificant fly-bat with any of the former animals, because it agrees with them in the number and situation of its teeth. To the second order it is objected, that the most intelligent of quadrupeds, the half-reasoning elephant, is made to associate with the most discordant and stupid of the creation, with sloths, ant-eaters, and armadillos, or with creatures of a quite different element, walrusses and morses. In the third order, again, which from its name should comprehend only the wild beasts or beasts of prey, it will be impossible (says Mr Pennant) to allow the mole, the shrew, and the harmless hedgehog, to be the companions of lions, wolves, and bears. We may err in our arrangement.

Sed non ut placidis locant immitia, non ut
*Serpentes avibus geminentur, tigribus agni**.

* Pennant's Synopsis, *Pref.*

To the sixth order it has been objected that the hoofed animals arranged under it are so dissimilar in their nature, that they ought not to be placed together without some intermediate gradations.

14 Answered.

To many of the above objections it may be replied, that all artificial arrangements have their disadvantages, and that if we follow nature in placing together only those animals that resemble each other in their external appearance, or in their habits of life, we shall often be obliged to arrange the individuals of what most naturalists consider as the same genus under very different parts of our system. The great object of a systematic arrangement is to facilitate the discovery of objects that are unknown; and for this purpose, in respect to quadrupeds, there is perhaps no method preferable to that which is founded on the diversity of their teeth and feet. We shall in the following article, as we have done in most of the preceding departments of natural history, adopt the arrangements of Linnæus, modifying according to the latest improvements of Gmelin and Shaw.

15 Classification of Pennant.

Our celebrated British naturalist, Mr Pennant, published the first edition of his Synopsis of Quadrupeds in 8vo, in 1771; and ten years after he published a third edition under the new title of History of Quadrupeds, in 2 vols. 4to. This work has gone through some other editions, and is justly admired for the quantity of information which the author has contrived to give in a very condensed form.

Mr Pennant distributes quadrupeds into four general divisions, containing such as are hoofed, digitated, pinnated, and winged.

The first division is subdivided into two sections: the first containing those animals whose hoofs are entire or of one piece, of which there is only one genus, viz. Horse. The second section those which are cloven-hoofed; of which there are 13 genera, comprising the Ox, Sheep, Goat, Giraffe, Antelope, Musk, Camel, Hog, Rhinoceros, Hippopotame, Tapir, and Elephant.

The second division consists of digitated animals, or those whose feet are divided into toes. It is subdivided into five sections; the first of which consists of those animals that are anthropomorphous, or which, in some measure, resemble man in their external form. Of these there are two genera, viz. Ape and Macauco. The second section consists of rapacious carnivorous animals,

Classification. mals, having six or more cutting teeth in each jaw, and large canine teeth separated from the cutting teeth. Of these there are eight genera, comprehending those of the Dog, Hyæna, Cat, Bear, Badger, Opossum, Weazel, and Otter. The third section contains animals that have no canine teeth, and only two cutting teeth in each jaw, being generally herbivorous or frugivorous. Of these there are 11 genera, viz. Cavy, Hare, Beaver, Porcupine, Marmot, Squirrel, Jerboa, Rat, Shrew, Mole, and Hedgehog. The fourth section comprehends those animals which are without cutting teeth, and which, like those of the last section, live on herbs and fruits. This section contains only two genera, viz. those of the Sloth and Armadillo. The fifth section contains animals that are destitute of teeth, and live on insects. Of these there are two genera, viz. Manis and Ant-Eater.

The third division consists of those animals that are pinnated or furnished with fins, and chiefly live in the water, feeding partly on fish and partly on herbage. Of these there are three genera, viz. the Walrus, Seal, and Manati.

The fourth division, or that of the winged quadrupeds, contains the single genus of the Bat, which being placed last in the order of quadrupeds, is thus made to form the connecting link between them and the class of birds.

16 Of Cuvier. According to Cuvier's arrangement, the mammalia are divided into three general orders: 1. Those having claws or nails; 2. Those having hoofs; and, 3. Those having feet like fins: a division very similar to that of Mr Pennant. The first of these orders is subdivided into those mammalia that have three sorts of teeth, and those that want at least one kind of teeth.

The first subdivision of the first order contains three families, viz.

I. Bimanum, having thumbs separate on the atlantal * extremities, comprehending Man alone.

* See *Barclay on Anatomical Nomenclature.*

II. Quadrumana, having the thumbs or great toes separate on each of the fore feet. This family contains two genera, viz. Simia or *Apes*, comprehending the subgenera pitheeus or *oran-otans*, callitrix or *sapajous*, cercopitheeus or *guenons*, cynocephalus or *macaques*, papio or *baboons*, cubes or *alouates;* and Lemur or *Makis*, comprehending the subgenera of lemur, indri, lori, galago, and tardipus.

III. Sarcophaga; having no separate thumbs or great toes on the atlantal extremity. This family is subdivided into four sections, viz. Cheiroptera, or those that have elongated hands and membranes, extending between the feet from the neck to the anus; Plantigrada, or those that have no separate thumbs or great toes, and who, in walking, apply the whole sole of the foot to the ground; Carnivora, or such as have no separate thumbs or great toes, and whose feet, in walking, rest only on the toes; and Pedimana, or such as have separate great toes on the sacral extremities or hind feet. The Cheiroptera comprise two genera, viz. Vespertilio or *Bats*, comprehending the subgenera of pteropus or *rousscts*, vespertilio or *common bats*, rinolaphus, phyllostoma, and noctilio; and Galeopithecus, or *Flying Lemurs*. The Plantigrada contain four genera, viz. Erinaceus or *Hedgehogs*, comprehending the subgenera of erinaceus or *hedgehogs*, and setiger or *tenrecs;* Sorex or *Shrews*, comprehending the subgenera of sorex or *shrew mice*, mygali or *musk shrew;* Chryso-Chloris, *Scalops;* talpa or *moles;* and Ursus or *Bears*, comprehending the subgenera of ursus or *bears*, taxus or *badgers*, nasua or *coatis*, procyon or *racoons;* potos or *kincajous*, ichneumon or *mangoustes*. The Carnivora comprise four genera, viz. Mustela, or *Weazels*, comprehending the subgenera of mustela, or *weazels* and *martins*, lutra or *otters*, mephites or *mouffites*, viverra or *civets;* Felis, or *Cat tribe;* and Canis, or the *Dog tribe*, comprehending the subgenera of canis and hyæna. The Pedimana contains only one genus, viz. Didelphis or *Opossum*, comprehending the subgenera of didelphis or *sariques*, dasyurus, phalangista or *phalangers*.

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IV. Rodentia, or such quadrupeds as want only the canine teeth. This family comprises eight genera, viz. Kangurus, *Kanguroos;* Hystrix or *Porcupines;* Lepus, or *Hares* and *Rabbits*, comprehending the subgenera of lepus and lagomys; Cavia, comprehending the subgenera of cavia and hydrochærus; Castor or *Beavers;* Sciurus or *Squirrels*, comprehending the subgenera of sciurus, and pteromys or *flying squirrels;* Cheiromys, or *Aye-aye;* and Mus, or *Rats* and *Mice*, comprehending the subgenera of aretomys or *marmots*, lemmus or *field mice*, fiber or *ondatra*, mus or *rats*, ericetus or *hamsters*, sphalax or *mole rat*, dipus or *jerboas*, myoxus or *dormice*.

V. Edentata, or those mammalia which have neither cutting nor canine teeth. This family comprises three genera, viz. Myrmecophaga, or *Ant-Eaters*, comprehending the subgenera of myrmecophaga, echidna or *porcupine ant-eaters*, and manis or *scaly lizards;* Orycteropus, or *Cape Ant-Eaters;* and Dasypus, or *Armadillos*.

VI. Tardigrada, or such as are deficient only in cutting teeth. Of this family there is only one genus, viz. Bradypus, or *Sloths;* under which Cuvier arranges as a subgenus, the unknown animal which he calls *megatherium*.

The second order, or those quadrupeds that are furnished with hoofs, comprises three families, with the following distinctions and subdivisions.

VII. Pachydermata, or those animals that have more than two toes and more than two hoofs. In this family there are six genera, viz. Elephas or *Elephants;* Tapir or *Tapirs;* Sus or *Swine;* Hippopotamus or *River horse;* Hyrax or *Daman;* and Rhinoceros.

VIII. Ruminantia, having two toes and two hoofs. Of this there are eight genera, viz. Camelus or *Camels*, divided into the subgenera of camelus and lama; Moschus or *Musks;* Cervus or *Deer;* Camelopardalis or *Giraffe;* Antelope or *Antelopes;* Capra or *Goats;* Ovis or *Sheep;* and Bos or *Oxen*.

IX. Solipeda, having one toe and one hoof, and comprising only one genus, viz. Equus or *Horse*.

The third order, or the mammalia with fin-like feet, contains two families, viz. Amphibia and Cetacea.

X. Amphibia, having four feet, and comprising two genera, viz. Phoca or *Seals;* and Trichecus or *Morses*.

XI. Cetacea, containing five genera, viz. Manatus or *Lamantins;* Delphinus or *Dolphins;* Physeter or *Cachalots;* Balæna or *Common Whales;* and Monodon or *Narwhal* *.

* *Lecons d'Anatomie Comparat.* vol. i.

Classification.

17 Generic characters.

18 Primates.

GENERIC CHARACTERS.

Ordo I. PRIMATES.

Homo. Situs erectus. Hymen et menstrua feminarum.

Man. Posture erect. Female furnished with a hymen, and menstruating.

1. Simia. Dentes laniarii, hinc remoti.
2. Lemur. Dentes primores superiores 4; inferiores 6.
3. Galeopithecus. Dentes primores superiores nulli; inferiores 6.
* 4. Vespertilio. Manus palmato-volatilis (A).

S. Tusks distant from each other.
L. Fore teeth upper 4; lower 6 in number.
G. Front teeth in the upper jaw wanting; in the lower 6.
V. Fore feet palmate, formed for flying.

19 Bruta.

Ordo II. BRUTA.

5. Bradypus. Dentes molares primo longiore, absque laniariis primoribusve. Corpus pilosum.
6. Myrmecophaga. Dentes nulli. Corpus pilosum.
7. Manis. Dentis nulli. Corpus squamatum.
8. Dasypus. Molares absque laniariis primoribusve. Corpus cataphractum.
9. Rhinoceros. Cornu in fronte positum.
10. Elephas. Dentes laniarii et molares. Nasus proboscide elongatus.
11. Sukotyro. Cornu ad utrumque latus prope oculos.
12. Platypus. Os anatinum. Pedes palmati.
13. Trichecus. Dentes laniarii superiores, molares ex osse rugoso. Pedes compedes.

B. Grinders longer in front, without tusks. Body hairy.
M. No teeth. Body hairy.
N. No teeth. Body scaly.
D. Grinders, without tusks or cutting teeth. Body crustaceous.
R. Horn seated in front.
E. Tusks and grinders. Nose elongated into a proboscis.
S. A horn on each side near the eyes.
P. Mouth like a duck's bill. Feet webbed.
T. Upper tusks. Grinders rough and bony. Hinder feet uniting into a fin.

20 Feræ.

Ordo III. FERÆ.

* 14. Phoca. Dentes primores superiores 6; inferiores 4.
* 15. Canis. Dentes primores 6, 6; superiores intermedii lobati.
* 16. Felis. Dentes primores 6, 6; inferiores æquales. Lingua aculeata.
* 17. Viverra. Dentes primores 6, 6; inferiores intermedii breviores.
* 18. Lutra. Dentes ut in Viverra. Pedes palmati.
* 19. Ursus. Dentes primores 6, 6; superiores excavati. Penis osse flexuoso.
20 Didelphis. Dentes primores superiores 10; inferiores 8.
21. Dasyurus. Dentes primores superiores 8; inferiores 6.
22. Macropus. Dentes primores superiores 6; inferiores 2. Molares utrinque 5, remoti.
* 23. Talpa. Dentes primores superiores 6; inferiores 8.

* P. Six upper cutting teeth; 4 lower.
* C. Front teeth, six in each jaw; the intermediate upper ones lobated.
* F. Cutting teeth six in each jaw; the lower equal. Tongue aculeate.
* V. Cutting teeth 6 in each jaw; the intermediate lower ones shorter.
* L. Teeth as in the last genus. Feet webbed.
* U. Cutting teeth 6 in each jaw; the upper hollowed. Penis furnished with a flexible bone.
D. Cutting teeth 10 in the upper jaw; 8 in the lower.
D. Cutting teeth 8 in the upper jaw; 6 in the lower.
M. Cutting teeth 6 in the upper jaw; 2 in the lower. Grinders 5 on each side, remote.
* T. Cutting teeth in the upper jaw 6; in the lower 8.

* 24.

(A) The genera marked * have one or more of the species indigenous to Britain.

Classification.

* 24. SOREX. Dentes primores superiores 2; inferiores 4.
* 25. ERINACEUS. Dentes primores superiores 2; inferiores 2.

* S. Cutting teeth in the upper jaw two; in the lower 4.
* E. Cutting teeth two in each jaw.

Classification.

21 Glires.

ORDO IV. GLIRES.

26. HYSTRIX. Corpus spinis tectum.
27. CAVIA. Dentes primores cuneati. Molares 4 ad utrumque latus. Claviculæ nulli.
28. CASTOR. Dentes primores superiores cuneati. Molares ad utrumque latus. Claviculæ perfectæ.
* 29. MUS. Dentes primores superiores cuneati. Molares 3 ad utrumque latus. Claviculæ perfectæ.
30. HYDROMYS. Pedes posteriores palmatæ. Cauda cyclindrica.
31. ARCTOMYS. Dentes primores cuneati. Molares superiores 5, inferiores 4, ad utrumque latus. Claviculæ perfectæ.
* 32. SCIURUS. Dentes primores superiores cuneati; inferiores acuti. Molares superiores 5, inferiores 4, ad utrumque latus. Claviculæ perfectæ. Cauda disticha. Mystaces longæ.
* 33. MYOXUS. Mystaces longæ. Cauda rotunda, apice crassior.
34. DIPUS. Pedes anteriores perbreves; posteriores prælongi.
* 35. LEPUS. Dentes primores superiores duplicati.
36. HYRAX. Dentes primores superiores lati. Cauda nulla.

H. Body covered with spines.
C. Cutting teeth wedge-shaped. Grinders 4 on each side. Clavicles wanting.
C. Upper cutting teeth wedge-shaped. Grinders 4 on each side. Clavicles complete.
* M. Upper cutting teeth wedge-shaped. Grinders 3 on each side. Clavicles complete.
H. Hind feet webbed. Tail round.

A. Cutting teeth wedge-shaped. Grinders 5 in the upper jaw, 4 in the lower, on each side. Clavicles complete.
* S. Upper cutting teeth wedge-shaped; lower acute. Grinders 5 in the upper jaw, 5 in the lower, on each side. Clavicles complete. Tail spreading towards each side. Whiskers long.
* M. Whiskers long. Tail round, thicker at the tip.
D. Fore feet short; hind feet very long.

* L. Upper cutting teeth double.
H. Upper cutting teeth broad. Tail wanting.

22 Pecora.

ORDO V. PECORA.

37. CAMELUS. Ecornis. Dentes laniarii plures.
38. MOSCHUS. Ecornis. Dentes laniarii solitarii; superioribus exsertis.
* 39. CERVUS. Cornua solida, ramosa, decidua. Dentes laniarii nulli.
40. CAMELOPARDALIS. Cornua brevissima. Pedes anteriores posterioribus multo longiores.
41. ANTILOPE. Cornua solida, simplicia, persistentia. Dentes laniarii nulli.
* 42. CAPRA. Cornua tubulosa, erecta. Dentes laniarii nulli.
* 43. OVIS. Cornua tubulosa reclinata. Dentes laniarii nulli.
* 44. BOS. Cornua tubulosa porrecta. Dentes laniarii nulli.

C. Without horns. Tusks many.
M. Without horns. Tusks single; upper projecting.
* C. Horns solid, branching, deciduous. Tusks wanting.
C. Horns very short. Fore feet much longer than the hind.
A. Horns solid, unbranched, persistent. Tusks wanting.
* C. Horns hollow, erect. Tusks wanting.
* O. Horns hollow, reclined. Tusks wanting.
* B. Horns hollow, turned outwards. Tusks wanting.

23 Belluæ.

ORDO VI. BELLUÆ.

* 45. EQUUS. Dentes primores superiores 6; inferiores 6.
46. HIPPOPOTAMUS. Dentes primores superiores 4; inferiores 4.
47. TAPIR. Dentes primores superiores 10; inferiores 10.
* 48. SUS. Dentes primores superiores 4; inferiores 6.

* E. Cutting teeth 6 in each jaw.
H. Cutting teeth 4 in each jaw.
T. Cutting teeth 10 in each jaw.
* S. Cutting teeth in the upper jaw 4; in the lower 6.

ORDO VII. CETE.—See CETOLOGY.

PART II. ARRANGEMENT AND HISTORY OF THE SPECIES.

Chap. I. PRIMATES.

OF this order we shall here give an account only of the four genera, Simia, Lemur, Galeopithecus, and Vespertilio, reserving Man for a separate article.

24 Simia.

Genus I. Simia. *Apes.*

Front teeth four in each jaw, near together; canine solitary, longer than the others, and at a distance from the grinders. Grinders obtuse.

The animals of this genus, which are best known by the familiar name of apes or monkeys, form a very interesting part of the animal creation; not so much for their importance and utility in relation to man, as on account of the near resemblance that they bear to the human species. They are a very lively tribe of animals, full of frolic, chatter, and grimace. From the structure of their limbs, they are capable of performing many actions in common with man; and we shall presently relate some diverting instances of their imitative powers. Most of them are fierce and untameable, though some are of a more gentle nature, and even seem capable of an attachment to man. In general, however, they are prone to mischief, and are filthy, obscene, lascivious, and thievish. When offended, they use threatening gestures; and when pleased, they appear to laugh. Many of them have cheek pouches, in which they keep for a while such food as they have not immediate use for. They are commonly gregarious, going together in vast companies, the different species never mixing with each other, but keeping apart, and in different quarters. They inhabit woods, and live on trees, leaping with vast activity from one tree to another, even though loaded with their young, which cling to them. They are not carnivorous, but chiefly feed on fruits and leaves, sometimes on insects, though, for mischief's sake, they will often rob the nests of birds of their eggs and young. They are themselves the prey of serpents, which pursue them to the trees and swallow them entire. They are also devoured by leopards and similar beasts of prey. Some species are eaten by the natives of the countries where they are found.

These animals are almost confined to the torrid zone; and, in particular, the woods of Africa, from Senegal to the Cape, and from thence to Ethiopia, are crowded with them. They are found in all parts of India, and its islands, in the south of China, in Cochin-China and Japan; and they swarm in the forests of South America, from the isthmus of Darien to Paraguay.

In some parts of India monkeys are objects of worship to the natives, and magnificent temples are erected in honour of them (B). In these countries they frequently come in vast numbers into the cities, and enter the houses without molestation. In Amadabad, the capital of Guzarud, there are three hospitals for animals, where lame and sick monkeys, and such as, though well, choose to dwell there, are fed and cherished. Twice a-week the monkeys of the neighbourhood assemble spontaneously in the streets of this city, mount on the houses which are flat-roofed, and lie here during the great heats. On these days the inhabitants take care to leave for them rice, millet, or fruit; and if by any accident they omit to do this, the disappointed animals become furious, break the tiles, and do other mischief.

From the great number of species, it has been found convenient to distribute them into three subdivisions, viz. those of apes, baboons, and monkeys. We shall enumerate the species under each of these subdivisions, with their specific characters, and shall then give a brief account of some of the most remarkable individuals.

A. Apes, destitute of tails. In this subdivision are reckoned 4 species, viz. 25 Apes.

1. *S. Satyrus*, Oran Otan, or Wild Man of the Wood. Tailless, either chesnut colour or black, without callosities behind, and with the hair on the lower parts of the arms reversed.—2. *S. Lar*, Great Gibbon or long-armed A. Tailless, usually black, without callosities behind, and with arms as long as the body.—3. *S. Inuus*, Magot or Barbary A. Tailless; pale brown, with callosities behind and an oblong head.—4. *S. Sylvanus*, Pigmy. Tailless; pale brown, with callosities behind, and a roundish head.

B. Baboons. Tails commonly short; bodies muscular. In this there are 16 species, viz. 26 Baboons.

5. *S. Sphinx*, Common B. Short tailed; brown, with callosities behind, with dull flesh-coloured face and pointed nails.—6. *S. Mormon*, Mantegar, or Great B. Short-tailed; tawney brown, with callosities behind; naked, tumid, violet blue cheeks, obliquely furrowed, and the middle of the nose blood-red.—7. *S. Maimon*, Mandril or Ribbed-nose B. Short-tailed; olive brown, with callosities behind; naked, violet-blue furrowed cheeks, and the middle of the nose flesh-coloured.—8. *S. Porcaria*, or Hog-faced B. Short-tailed; brown, covered behind, with black naked hog-like face and pointed nails.—9. *S. Sylvicola*, Wood B. Short-tailed, fleshy brown, with callosities behind, and with black naked face, hands, and feet.—10. *S. Sublutea*, Yellow

(B) When the Portuguese got possession of the island of Ceylon, they found in one of the temples dedicated to these animals, a golden casket containing the tooth of an ape; a relick which the natives held in such veneration, that they offered to redeem it at no less a price than 700,000 ducats. The viceroy, however, ordered it to be burned; but, some years afterwards, a fellow, who was in the Portuguese ambassador's train, having procured a similar tooth, pretended that it was the old one, and offered it to the priests, who were so much rejoiced at the recovery of their lost treasure, that they purchased it of the fellow for above 10,000l. of our money.

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low B. Short-tailed; yellow, freckled with black, with naked black face and hands, hairy on the upper surface.—11. *S. Cinerea*, Cinereous B. Short-tailed; cinereous, with the crown spotted with yellow; brown face and pale beard.—12. *S. Dentata*, Broad-toothed B. Short-tailed, ash brown, with bluish face, and very large fore teeth.—13. *S. Fusca*. Brown B. Shortish tailed; brown, with callosities behind, a whitish face, and a very broad nose.—14. *S. Nemestrina*. Pig-tailed B. Olive brown, with a short naked tail.—15. *S. Cristata*. Crested B. Short-tailed; black, with very long hair on the crown and cheeks; whitish breast, and bare face and hands.—16. *S. Apedia*, Little B. Short-tailed; yellowish, without callosities behind, with thumbs standing close to the fingers, and furnished with rounded nails; the fingers with narrow ones.—17. *S. Hamadryas*, Dog-faced B. Tail gray, with callosities behind; sharpish claws, and the hairs on each side of the head very long.—18. *S. Ferox*, Lion-tailed B. Tailed; black, with very large whitish spreading beard.—19. *S. Cynosuros*. Pale brown, beardless, with callosities behind, and with longish flesh-coloured face; a whitish band across the forehead, and a longish sharp-pointed tail.—20. *S. Rugata*, Wrinkled B. Short-tailed, yellowish brown; whitish beneath, with flesh-coloured face, and large blood-red wrinkled callosities behind.

27 Monkeys.

C. Monkeys. Tails generally long. This subdivision contains 42 species, viz.

21. *S. Leonina*, Leonine Monkey. Black, with callosities behind, very large whitish beard, and very long tufted tail.—22. *S. Cynomulgus*, Hare-lipped M. Long-tailed, beardless, with callosities behind, rising bifid nostrils, and arched tail.—23. *S. Veter*, Purple-faced M. Long-tailed; white, with black beard.—24. *S. Roloway*, Roloway or Raloure M. Short-tailed, blackish; white beneath, with triangular face, surrounded by a white divided beard.—25. *S. Diana*, Diana or Spotted M. Long-tailed, blackish, freckled with white; the hair of the forehead and beard growing in a pointed form, with a lunated band across the forehead.—26. *S. Nasuta*, Long-nosed M. Long-tailed, blackish-rusty; pale ash-coloured beneath, with long naked flesh-coloured face.—27. *S. Flavescens*, Yellowish M. Long-tailed, bearded, cinereous; yellow, with black face and ears.—28. *S. Sabæa*, Green M. Long-tailed, yellowish gray, with black face and callosities behind.—29. *S. Æthiops*, Mangabey or White-eyelid M. Long-tailed, beardless, with black face; white eyelids, white frontal band, and the hair on the forehead upright.—30. *S. Cephas*, Mustache M. Long-tailed, blackish rusty, whitish beneath, with bearded cheeks and yellowish crown; red eye-lids and whitish muzzle.—31. *S. Nictitans*, White-nosed M. Long-tailed, beardless, black, freckled with white; the thumb of the hands very short, and no callosities behind.—32. *S. Talapoin*. Long-tailed, olive-coloured; bearded cheeks, and black ears, nose, and soles.—33. *S. Maura*, Negro M. Long-tailed, blackish, with swarthy flesh-coloured face and breast, and blackish beard.—34. *S. Aygula*, Egret M. Long-tailed, beardless; gray, with a rising longitudinal tuft on the crown.—35. *S. Rubra*, Red M. Long-tailed, red pale ash-coloured beneath, with bearded cheeks, and a black or white band across the forehead.—36. *S. Sinica*, Chinese M. Beardless, pale brown, with the hair of the crown spreading round horizontally.—37. *S. Petaurista*, Vaulting M. Olive black; white beneath, with a triangular white spot on the nose.—38. *S. Pileata*, Bonneted M. Rusty brown, whitish; yellow beneath, with black limbs, and the hair at the head rising circularly upwards.—39. *S. Mona*, Varied M. Olive rusty; white beneath, with the cheeks bearded, and a lunated whitish band across the forehead.—40. *S. Nasalis*, Proboscis M. Long-tailed, bearded, chesnut colour, with pale limbs and tail, and a very long nose.—41. *S. Nemæus*, Cochin China M. Long-tailed, with bearded cheeks and white tail.—42. *S. Fulva*, Tawney M. Subferruginous, with the lower part of the back orange, white beneath, with flesh-coloured face and ears.—43. *S. Hircina*, Goat M. Long-tailed, brown, with blue furrowed nose, and long-pointed beard.—44. *S. Comosa*, Full-bottom M. Long-tailed, black, with very long spreading whitish hair on the head, and white tail.—45. *S. Ferruginea*, Bay M. Long-tailed, rusty, with black limbs and tail.—46. *S. Annulata*, Annulated M. Rusty brown, whitish beneath, with annulated tail, shorter than the body.—47. *S. Pithecia*, Fox-tailed M. Blackish brown, with the tips of the hair whitish, and very bushy tail.—48. *S. Iacchus*, Striated M. Long-tailed, with spreading hairy ears; crooked hairy tail and sharp claws, those on the thumb being rounded.—49. *S. Oedipus*, Red-tailed M. Long, red-tailed, beardless, with the hair of the head spreading downwards, and sharp nails.—50. *S. Rosalia*, Silky M. Long-tailed, silky hair, with long hair on the head; yellow body, reddish round the face, and pointed claws.—51. *S. Nudus*, Great-eared M. Long-tailed, black, with large naked square ears, orange-coloured feet, and pointed nails.—52. *S. Argentata*, Fair M. Long-tailed, beardless, white, with red face and brown tail.—53. *S. Beelzebul*, Preacher M. Bearded, black, the feet and tip of the tail brown; tail prehensile.—54. *S. Sciniculus*, Royal M. Long-tailed, bearded, red; tail prehensile.—55. *S. Paniscus*, Four-fingered M. Long-tailed, bearded, black, with four-fingered feet; tail prehensile.—56. *S. Fatuellus*, Horned M. Long-tailed, beardless, with two horns like tufts on the head; tail prehensile.—57. *S. Trepida*, Fearful M. Long-tailed, beardless, with upright hair on the head, and bluish feet; tail prehensile.—58. *S. Apella*, Weeper M. Long-tailed, beardless; brown body, black feet, and without callosities; tail prehensile.—59. *S. Capucina*, Capuchin M. Long-tailed, beardless, without callosities, with black crown and limbs, and hirsute prehensile tail.—60. *S. Sciurea*, Squirrel M. Long-tailed, yellowish gray, beardless, with orange-coloured hands and feet; four of the claws, and the hind feet pointed.—61. *S. Antiguensis*, Antigua M. Blackish brown, white beneath, with black limbs and face, bearded cheeks, and brown prehensile tail.—62. *S. Morta*, Naked-tailed M. Long-tailed, beardless, brown, with dusky muzzle, and naked scaly tail.

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28 *Satyrus*, Oran Otan.

Species 1. *S. Satyrus*. Oran Otan, Wild Man of the Woods. *Chimpanzee*, *Jocko*. Tailless Ape.—It is generally believed by naturalists, that the animals which have been described under the names given above, are only varieties of the same species, differing from each other in size, colour, sex, and some other trifling shades of discrimination. Four remarkable specimens have

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have been described by authors of repute; one by our countryman Tyson; another by Professor Allamand; a third by Vosmaer; and a fourth by Edwards.

The oran otan is said sometimes to have attained the height of six feet: the specimens brought into Europe have seldom exceeded the half of that stature. His strength, however, is very great; and, in his native forests, it is said that the most muscular man is by no means a match for him. His colour is usually a dusky brown; almost the whole body, except the feet and palms of the hands, is covered with hair: but in some varieties the face is said to be nearly as bare as the human. Indeed there is no animal which bears so strong a resemblance to man as this species. His hands, feet, and ears are almost exactly human; and, to a superficial observer, many others of its features so nearly resemble those of a man, that he has been considered, by some writers, as man in his rudest and most uncultivated state. On a closer examination, however, it has been found, that there are marks of distinction sufficiently strong to overturn an opinion so humiliating to the lords of the creation, and to demonstrate, that even in anatomical structure this animal differs as much from the most savage of the human species, as the latter does in point of sagacity and reasoning powers from the most cultivated European. The nose of the oran-otan is flatter, and his mouth wider, than that of the Negro; his forehead is more oblique; his chin has no elevation at the base, his eyes are much nearer each other, and the distance betwixt the nose and the mouth is much greater than in man. He has also no calves to his legs, and, though he sometimes walks on two, it is pretty certain that this attitude is not natural to him. Buffon has asserted that these animals always walk upright, and has made this circumstance one of the distinguishing characters of his division of apes. It is now, however, generally understood, that this assertion is too hasty: and it is the opinion of those most capable of judging, that the oran otan, like all other animals except man, was intended by nature to walk on all fours. See MAN.

On the whole it appears that there are two principal varieties of this species; one of which has been distinguished by the name of pongo, or great oran otan, and the other has been called jocko. The following account is given of the pongo by Battel. "This pongo is all proportioned like a man, but that he is more like a giant in stature than a man; for he is very tall, and hath a man's face, hollow-eyed, with long hair upon his brows. His face and ears are without hair, and his hands also. He differeth not from man but in his legs, for they have no calf. He goes always upon his legs, and carrieth his hands clasped on the nape of his neck when he goeth upon the ground. They sleep in the trees and build shelters from the rain. They feed upon fruit that they find in the woods and upon nuts, for they eat no kind of flesh. They cannot speak, and have no understanding more than a beast. The people of the country when they travel in the woods, make fires where they sleep in the night; and in the morning when they are gone, the pongo will come and sit about the fire till it goeth out; for they have no understanding to lay the wood together. They go many together, and kill many negroes that travel in the woods. Many times they fall upon the elephants, which come to feed where they be, and so beat them with their clubbed fists, and pieces of wood, that they will run roaring away from them. Those pongoes are never taken alive, because they are so strong that ten men cannot hold one of them, but yet they take many of their young ones with poisoned arrows. The young pongo hangeth on his mother's belly, with his hands clasped about her, so that when any of the country people kill any of the females, they take the young one, which hangeth fast upon his mother*." Primates.

* *Buffon by Smellie*, vol. viii.

This is almost the only account which we have of the oran otan in its native state. The other relations of its habits and manners are descriptive of it in a state of captivity, and of these we shall present our readers with some of the most remarkable.

Mr Buffon gives us the following account of a jocko, which he saw in France. "The oran otan which I saw walked always on two feet, even when carrying things of considerable weight. His air was melancholy, his gait grave, his movements measured, his disposition gentle, and very different from those of other apes. He had neither the impatience of the Barbary ape, the maliciousness of the baboon, nor the extravagance of the monkeys. It may be alleged (says our author) that he had the benefit of instruction; but the other apes, which I shall compare with him, were educated in the same manner. Signs and words were alone sufficient to make our oran otan act; but the baboon required a cudgel, and the other apes a whip; for none of them would obey without blows. I have seen this animal present his hand to conduct the people who came to visit him, and walk as gravely along with them as if he had formed a part of the company. I have seen him sit down at table, unfold his towel, wipe his lips, use a spoon or a fork to carry the victuals to his mouth, pour his liquor into a glass, and make it touch that of the person who drank along with him. When invited to tea, he brought out a cup and saucer, placed them on the table, poured out the tea, and allowed it to cool before he drank it. All these actions he performed without any other instigation than the signs or verbal orders of his master, and often of his own accord. He did no injury to any person; he even approached company with circumspection, and presented himself as if he wanted to be caressed. He was very fond of dainties, which every body gave him: and as his breast was diseased, and he was affected with a teazing cough, this quantity of sweet-meats undoubtedly contributed to shorten his life. He lived one summer in Paris, and died in London the following winter. He ate almost every thing, but preferred ripe and dried fruits to all other kinds of food. He drank a little wine, but spontaneously left it for milk, tea, or other mild liquors †." † *Buffon, ubi supra.*

Doctor Tyson describes the oran otan which was exhibited in London about the end of the seventeenth century as the most gentle and loving creature that could be. Those that he knew on board the ship in which he was brought to England, he would come and embrace with the greatest tenderness, and though there were other monkeys on board, it was observed that he would never associate with any of them, but always avoided their company as of nothing akin to them. He was sometimes drest in clothes, of which he at length became very fond, would put on part of them without help, and carry the rest in his hands to some of the

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the company for their assistance. He would lie in bed, lay his head on the pillow, and pull up the bed clothes to keep himself warm *.

* *Anatomy of a Pigmy.*

Pere Carbasson brought up an oran otan, which became so fond of him, that wherever he went it was always desirous of accompanying him: whenever, therefore, he had to perform the service of his church, he was obliged to shut it up in a room. Once, however, the animal escaped and followed the father to the church, where, mounting on the sounding board above the pulpit, he lay perfectly still till the sermon commenced. He then crept to the edge of the board, and overlooking the preacher, imitated all his gestures in so grotesque a manner, that the congregation was unavoidably caused to laugh. The father, surprised and confounded at this ill-timed levity, reproved his audience for their inattention. The reproof failed in its effect; the congregation still laughed, and the preacher in the warmth of his zeal redoubled his vociferations and his actions; these the ape so exactly imitated, that the congregation could no longer restrain themselves, but burst into a loud and continued laughter. A friend of the preacher at length stepped up to him, and pointed out the cause of this improper conduct; and such was the arch demeanour of the animal, that it was with the utmost difficulty he could command his countenance and keep himself apparently serious, while he ordered the servant of the church to take the ape away.

Perhaps one of the most interesting accounts of the oran otan is that given by Vosmaer, and with this we shall close our history of this species.

Plate CCCI. fig. 1.

"This animal (says M. Vosmaer) was a female; its height was about two Rhenish feet and a half. It shewed no symptoms of fierceness or malignity, and was even of a somewhat melancholy appearance. It was fond of being in company, and showed a preference of those who took daily care of it, of which it seemed to be sensible. Often when they retired, it would throw itself on the ground, uttering lamentable cries, and tearing in pieces the linen within its reach. Its keeper having sometimes been accustomed to sit near it on the ground, it took the hay of its bed, and laid it by its side, and seemed by every demonstration to invite him to be seated near. Its usual manner of walking was on all fours, like other apes, but it could also walk on its two hind feet only. One morning it got unchained, and we beheld it with wonderful agility ascend the beams and rafters of the building; it was not without some pains that it was retaken, and we then remarked an extraordinary muscular power in the animal, the assistance of four men being necessary to hold it in such a manner as to be properly secured. During its state of liberty it had among other things taken a cork from a bottle of Malaga wine, which it drank to the last drop, and had set the bottle in its place again. It ate almost every thing which was given to it; but its chief food was bread, roots, and especially carrots, all sorts of fruits, especially strawberries; and it appeared extremely fond of aromatic plants, and of the leaves and roots of parsley. It also ate meat, both boiled and roasted, as well as fish. It was not observed to hunt for insects like other monkeys; was fond of eggs, which it broke with its teeth, and sucked completely; but fish and roasted meat seemed its favourite food. It had been taught to eat with a spoon and a fork. When presented with strawberries on a plate, it was extremely pleasant to see the animal take them up one by one with a fork, and put them into its mouth, holding at the same time the plate in the other hand. Its common drink was water, but it also very willingly drank all sorts of wine, and particularly Malaga. After drinking, it wiped its lips; and after eating, if prescuted with a toothpick, would use it in a proper manner. I was assured (continues our writer), that on shipboard it ran freely about the vessel, played with the sailors, and would go like them into the kitchen for its mess. At the approach of night, it lay down to sleep, and prepared its bed by shaking well the hay on which it slept, and putting it in proper order, and lastly covering itself with the coverlet. One day seeing the padlock of its chain opened with a key, and shut again, it seized a little bit of stick, and put it into the key-hole, turning it about in all directions, endeavouring to see whether the padlock would open or not. This animal lived seven months in Holland. On its first arrival it had but very little hair except on its back and arms; but on the approach of winter it became extremely well covered; the hair on the back being three inches in length. The whole animal then appeared of a chesnut colour; the skin of the face, &c. was of a mouse colour, but about the eyes and round the mouth, of a dull flesh colour." It came from the island of Borneo, and was after its death deposited in the museum of the prince of Orange.

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3. *S. Inuus.* Magot, Barbary Ape.—This species is considered by some naturalists as forming the connecting line between the ape, properly so called, and the baboon. Like the latter it has posterior callosities, and though it properly has no tail, it is furnished with an appendage of skin in the place where the tail is situated in other species. The hair on the greatest part of its body is of a greenish brown, the belly being paler than the rest; the face is of a swarthy flesh-colour, and the fingers and toes are furnished with nails resembling those of the human species.

Inuus. Barbary Ape. Fig. 2.

It is found most commonly in Barbary and some other parts of Africa as far as the Cape of Good Hope, and it is also occasionally met with in Tartary, in Arabia, and in some parts of the Indian peninsula.

It is probable that Tavernier alludes to this species, in the account he gives of a custom amongst some of the inhabitants of India of amusing themselves at the expence of the ape. These people place five or six baskets of rice, forty or fifty yards asunder, in an open ground near their retreat, and by every basket put a number of stout cudgels, each about two feet long; they then retire to some hiding place not far distant, to wait the event. When the apes observe no person near the baskets, they soon descend in great numbers from the trees, and run towards them: they grin at each other for some time before they dare approach; sometimes they advance, then retreat, seeming much disinclined to encounter. At length the females, which are more courageous than the males, especially those that have young ones (which they carry in their arms as women do their children), venture to approach the baskets, and as they are about to thrust their heads in to eat, the males on the one side advance to hinder them. Immediately the other party comes forward; and the feud being kindled on both sides, the combatants seize the

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cudgels, and commence a most severe fight, which always ends with the weakest being driven into the woods, with broken heads and limbs. The victors, he tells us, then fall to in peace, and devour the reward of their labour.

Of all the apes this agrees best with the temperature of an European climate, and may easily be kept in a state of domestication. Buffon had one which he kept for several years. In summer he delighted to be in the open air, and in winter he appeared sufficiently comfortable in a room without a fire, which shewed he was by no means delicate. He was always of a grave deportment, and sometimes dirty in his manner. His movements were brisk, and his countenance rather ugly than ridiculous. When agitated with passion, he exhibited and grinded his teeth. He filled the pouches of his cheeks with the food which was given him, and generally ate every thing except raw flesh, cheese, and whatever had undergone a kind of fermentation. When about to sleep, he loved to perch upon an iron or wooden bar. He was always chained, because though he had been long in a domestic state he was not civilized, and had no attachment to his masters. He seems to have been ill educated, for Buffon had seen others of the same species more intelligent, more obedient, more gay, and so docile as to learn to dance and make gesticulations in cadence, and to allow themselves peaceably to be clothed.

The flesh of this species is used as food by the wild Arabs.

30 *Sylvanus*, Pigmy. Fig. 3.

4. *S. Sylvanus. Pitheque.* Pigmy.—This species greatly resembles the last, except that its head is rounder, and that it is much inferior in size, being seldom larger than a cat. It is thought by Mr Pennant to be the pigmy of the ancients; or one of that nation which was by them supposed to carry on periodical wars with the cranes. It is a native of Africa, and is also found in the East Indies and in Ceylon. They associate in troops, and live chiefly on vegetable food. They are often found walking erect. They are said to be very malicious and spiteful.

We are told by Marmol that they go in troops into the gardens or fields; but before they leave the thickets, one of them ascends an eminence from which he views the country; and when he sees no person, he gives the signal by a cry for the rest to proceed, and removes not from his station as long as they continue abroad: but whenever he perceives any person approaching, he screams with a loud voice, and by leaping from tree to tree they all fly to the mountains. Their flight is worthy of admiration; for the females, though they carry four or five young ones on their backs, make great springs from branch to branch. Though extremely cunning, vast numbers of them are taken by different arts. When wild they bite desperately, but by caresses they are easily tamed. They do much mischief to the fruits and corn; for they gather it together in heaps, cut it, and throw it on the ground whether it be ripe or not, and destroy more than they eat or carry off. Those who are tamed perform things incredible, and imitate every human action.

They chiefly reside in caverns, which gives the natives an easy opportunity of taking them alive. For this purpose the natives place vessels containing intoxicating liquors in the caverns frequented by the apes, and these animals assemble together to drink these liquors. After having become intoxicated, they fall asleep, and are easily taken by the hunters.

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5. *S. Sphinx.* Great baboon. *Papion. Mottled baboon.*—This is a very large species, measuring when sitting on its posteriors, three or four feet high. It is very strong and muscular, especially towards the fore parts of the body; but its waist, as is common to all the baboons, is slender. All the nails are not pointed, those on the thumbs and great toes being rounded. The tail is short and thick, and rounded; the posteriors are perfectly bare and callous, and of a red colour.

Sphinx, Great baboon. Fig. 4.

The baboon is a native of Borneo, and of the hottest parts of the African continent. It lives chiefly on vegetables, but is said to be very fond of eggs. The female brings forth one young at a time, and carries it in her arms.

From the great size and strength of these animals they are not a little formidable; and as their natural disposition is very ferocious, it is dangerous to encounter any number of them in their native wilds.

The baboons are passionately fond of raisins, apples, and in general of all fruits which grow in gardens. Their teeth and paws render them formidable to dogs, who overcome them with difficulty, unless when eating has made them heavy and inactive. Buffon has remarked that they neither eat fish nor flesh, except when boiled or roasted, and then they devour both with avidity. In their expeditions to rob orchards, gardens, or vineyards, they generally go in troops. Some of them enter the inclosure, while others remain on the walls as sentinels to give notice of any approaching danger. The rest of the troop are stationed without the garden, at convenient distances from each other, and thus form a line, which extends from the place of pillage to that of their rendezvous. Matters being disposed in this manner, the baboons begin the operation, and throw to those on the wall melons, gourds, apples, pears, &c. Those on the walls throw these fruits to their neighbours below; and thus the spoils are handed along the whole line, which generally terminates on some mountain. They are so dexterous and quick-sighted, that they seldom allow the fruit to fall in throwing it from one to another. All this is performed with profound silence and great despatch. When the sentinels perceive any person, they cry, and at this signal the whole troop fly off with astonishing rapidity.

In confinement the great baboon loses nothing of his native ferocity. He is indeed one of the most unmanageable of his tribe, grinding his teeth, putting on a threatening aspect, and shaking the bars of his cage so as often to make the spectators tremble. Mr Smellie speaks of one that he saw at Edinburgh in 1779, that was remarkable for its size, strength, and beautiful colours. He was nearly five feet high, and was excessively fierce, presenting uniformly to the spectators a most threatening aspect, and attempting to seize every person that came within the length of his chain. On such occasions he made a deep grunting noise, and was perpetually tossing up his head. This seems to have been the same animal that is described by Mr Pennant as having been seen by him at Chester about two months after the time mentioned by Mr Smellie. He was particularly fond of cheese; his voice was a kind of roar not unlike that of a lion, but low and somewhat inward.

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It went on all-fours, and never stood on its hind legs unless forced to do so by its keeper. He would frequently sit on his rump in a crouching posture, and drop his hands before his belly *.

* *Smellie's Buffon*, vol. viii.

It is not a little extraordinary that an animal of this disposition should be kept in private houses as a pet, especially when we consider the mischiefs that they often commit. Dr Goldsmith says that he has seen one of them demolish a whole service of china, without appearing in the least conscious of having done amiss, though the mischief was evidently intentional.

32. *Nemestrina*. Pig-tailed Baboon.

14. *S. Nemestrina*. Pig-tailed baboon.—Olive brown, with short naked tail.

This is but a small species, seldom exceeding the size of a cat. The tail exactly resembles that of a pig. It is a native of Sumatra, and is very lively and active. He is sometimes seen in an exhibition in this country, but seldom lives long in a climate so much colder than his own.

Mr Edwards had a male of this species: it lived with him for a year, and was about the size of a common house cat. Another of the same species being at that time exhibited at Bartholomew fair in London, Mr Edwards carried his to compare with it; and he remarks that they seemed highly pleased with each others company, though this was the first time of their meeting.

33. *Beelzebul*, Preacher Monkey. Fig. 5.

53. *S. Beelzebul*. Preacher monkey.—This species is found in great numbers in the woods of South America, especially in Guiana and Brasil. It is the largest of the American monkeys, being about the size of a fox, and of a glossy black colour. There is in the throat of this animal a hollow bony substance, which is supposed to produce that peculiar dreadful howl for which this animal and the next species are so remarkable. They are exceedingly mischievous and spiteful, and if attacked they bite cruelly. They usually keep together in parties of from 20 to 30, rambling over the tops of the trees, and leaping with great agility from one tree to another. If they see any one approach alone, they always teaze and threaten him.

Maregrave informs us that they assemble every morning and evening in the woods of Brasil, and make a most dreadful howling. Sometimes one of them mounts on a higher branch, and the rest seat themselves beneath: the first begins, as it were to harangue, and sets up a howl so loud and sharp as to be heard to a great distance: after a while, he gives a signal with his hand, when the whole assembly joins in chorus; but on another signal they are again silent, and the orator finishes his address. Their clamour is the most disagreeable and tremendous that can be conceived.

They are extremely sagacious; and when hunted, not only distinguish particularly those who are active against them, but defend themselves vigorously when attacked. When the hunters approach, the monkeys assemble together, uttering loud and fearful cries, and throwing at their assailants dried branches which they wrench from the trees. It is said that they never abandon each other, and that in passing from tree to tree they fling themselves headlong from one branch to another without ever falling to the ground, always catching hold either with their hands or tail. If they are not at once shot dead it is scarcely possible to take them, as, though mortally wounded, they cling so firmly to the trees as to maintain their hold even after death.

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Gen. 3. LEMUR. *MACAUCOS*.

34 Lemur.

Four front teeth in the upper jaw, the intermediate being remote; six in the lower jaw, longer, stretched forwards, compressed, parallel, and approximated. Canine teeth solitary and approximated. Grinders sublobated, the foremost of them being rather longer and sharper than the rest.

The animals of this genus resemble the monkey tribe in the use of their hands, but they are much less mischievous and ferocious than that tribe. None of them, except the *indri*, bears any resemblance to man; but in this species the arms, hands, body, and feet, are very similar to the human. A few of them are tailless, but most of them have long tails.

They are harmless inoffensive creatures, live chiefly in woods, and feed on fruits, vegetables, or insects. At least one species, viz. the 12th, serves for food to the natives of the countries where it is found.

There are 13 species which are distinguished by the following names and characters:

1. *Lemur Tardigradus*. Slow Lemur. Tailless; of a rusty ash colour, with a brown dorsal line; very small ears.—2. *L. Loris*. Loris. Tailless; of a rusty ash colour, with extremely slender limbs, and large ears.—3. *L. Indri*. Indri. Tailless; black, grayish beneath, with the face and space round the anus whitish.—4. *L. Potto*. Potto. Tailed; subferruginous.—5. *L. Mongoz*. Mongoz or Woolly L. Long-tailed; gray brown.—6. *L. Macaco*. Ruffed L. Tailed; black, with the neck bearded like a ruff.—7. *L. Laniger*, Flocky L. Tailed; pale tawney, white beneath, with rusty tail.—8. *L. Catta*. Ring-tailed L. Tail long, and annulated with black and white.—9. *L. Bicolor*. Heart-marked L. Long-tailed; blackish white beneath, with a white heart-shaped spot on the forehead.—10. *L. Tarsier*. Tarsier. Long-tailed; ash-coloured; with slender almost naked tufted tail; and very long hinder feet.—11. *L. Murinus*. Tail long, and rusty; body ash coloured.—12. *L. Calago*. Whitish L. Tail long and rusty; body whitish, gray beneath.—13. *L. Psilodactylus*. Long-fingered K. Ash-ferruginous, with extremely villose tail, and the middle finger of the hands very long and naked.

35 *Tardigradus*, Slow Lemur. Fig. 7.

1. *L. Tardigradus*. Slow Lemur.—This animal is about the size of a small cat, with the body of an elegant pale brown or mouse-colour; a flattish face, extremely prominent eyes, that are surrounded with a circle of dark brown, and a sharpish nose. Of its manners in its native state we know almost nothing, but in a state of domestication it has been accurately observed.

The late Sir William Jones had one of these animals in his possession for some time, and has given a very interesting account of its form and manners. This was published in the Asiatic Researches, from which we shall extract the most interesting particulars.

"In his manner he was for the most part gentle, except in the cold season, when his temper seemed wholly changed; and his Creator who made him so sensible to cold, to which he must often have been exposed even in his native forests, gave him probably for that reason,

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his thick fur, which we rarely see in animals in these tropical climates: to me, who not only constantly fed him, but bathed him twice a-week in water accommodated to the seasons, and whom he clearly distinguished from others, he was at all times grateful; but when I disturbed him in winter, he was usually indignant, and seemed to reproach me with the uneasiness which he felt, though no possible precaution had been omitted to keep him in a proper degree of warmth. At all times he was pleased with being stroaked on the head and throat, and frequently suffered me to touch his extremely sharp teeth; but his temper was always quick, and when he was unseasonably disturbed, he expressed a little resentment, by an obscure murmur, like that of a squirrel, or a greater degree of displeasure by a peevish cry, especially in winter, when he was often as fierce, on being much importuned, as any beast of the woods.

"From half an hour after sunrise to half an hour before sunset, he slept without intermission, rolled up like a hedgehog; and, as soon as he awoke, he began to prepare himself for the labours of his approaching day, licking and dressing himself like a cat; an operation which the flexibility of his neck and limbs enabled him to perform very completely: he was then ready for a slight breakfast, after which he commonly took a short nap; but when the sun was quite set he recovered all his vivacity.

"His ordinary food was the sweet fruit of this country; plantains always, and mangoes during the season; but he refused peaches, and was not fond of mulberries, or even of guiavas: milk he lapped eagerly, but was content with plain water. In general he was not voracious, but never appeared satisfied with grasshoppers; and passed the whole night, while the hot season lasted, in prowling for them: when a grasshopper, or any insect, alighted with his reach, his eyes, which he fixed on his prey, glowed with uncommon fire; and having drawn himself back to spring on it with greater force, he seized the prey with both his fore paws, but held it in one of them while he devoured it. For other purposes, and sometimes even for that of holding his food, he used all his paws indifferently as hands, and frequently grasped with one of them the higher parts of his ample cage, while his three others were severally engaged at the bottom of it; but the posture of which he seemed fondest was to cling with all four of them to the upper wires, his body being inverted; and in the evening he usually stood erect for many minutes, playing on the wires with his fingers, and rapidly moving his body from side to side, as if he had found the utility of exercise in his unnatural state of confinement.

"A little before daybreak, when my early hours gave me frequent opportunities of observing him, he seemed to solicit my attention; and if I presented my finger to him, he licked or nibbled it with great gentleness, but eagerly took fruit when I offered it, though he seldom ate much at his morning repast; when the day brought back his night, his eyes lost their lustre and strength, and he composed himself for a slumber of ten or eleven hours.

"My little friend was, on the whole, very engaging: and when he was found lifeless in the same posture in which he would naturally have slept, I consoled myself with believing that he died without much pain, and lived with as much pleasure as he could have enjoyed in a state of captivity."

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Its pace is exceedingly slow, scarcely moving above six or eight yards in a minute; whence its name.

It is of considerable importance in a physiological point of view, to investigate the structure of these slow moving animals, such as the species just described, and the sloth to be afterwards mentioned. An anatomical examination of the blood-vessels in the limbs of this species by Mr Carlisle has thrown considerable light on the connection of slow motion with a particular distribution of the arteries in the slow-moving limbs; this distribution is thus described by Mr Carlisle. "Immediately after the subclavian has penetrated the axilla it is divided into 23 equal-sized cylinders, which surround the principal trunk of the artery, now diminished in size to an inconsiderable vessel. These cylindrical arteries accompany each other, and divide with the ulnar and radial branches, being distributed in their route upon the muscles, each of which has one of these cylinders. The other branches, for example the radial and ulnar, proceed like the arteries in general, dispersing themselves upon the skin, the membranes, joints, bones, &c. in an arborescent form. The iliac artery divides upon the margin of the pelvis into upwards of twenty equal-sized cylinders, surrounding the main trunk as described in the axillary artery. These vessels are also finally distributed, as in the upper extremity; the cylinders wholly upon the muscles, and the arborescent branches on all the other parts. The carotid arteries do not divide the equal-sized cylinders, but are distributed as in the generality of animals*."

* *Shaw's Zoology*, vol. i.

Gen. 3. GALEOPITHECUS. *CALUGO.*

36 Galeopithecus.

Front teeth in the upper jaw wanting; in the lower six, short, broad and pectinated. Canine teeth very short, triangular, broad, sharp and serrated. Grinders four, truncated, and muricated with conical protuberances. Flying skin surrounding the body, limbs, and tail.

There is only one species, viz.

37 *Volans*, Flying Lemur. Fig. 8.

G. Volans. Flying Calugo, or Flying Lemur.—This is one of those extraordinary quadrupeds whom nature has raised above their usual element, and enabled them to transport themselves through the air in a manner which, though it cannot strictly be denominated *flying*, is at least very similar to it. The body of the flying lemur is about three feet long; but, except when the membrane is expanded, it is very slender. It has a slender tail, about a span long. The membrane, which extends from the neck to the fore legs, hind legs, and tail, is covered with fur, but appears membranaceous on the inner side. The upper side of the animal is of a deep ash colour, inclining to black when young, and the back is crossed transversely with blackish lines. Its head is long, its mouth small, and its teeth differ from those of every other quadruped hitherto examined. The cutting teeth in the lower jaw are deeply cut like a comb; the canine teeth, as Pallas calls them, (though Geoffroy thinks they are more properly cutting teeth), are triangular, very broad at the base, and very short. The cæcum or large intestine is very voluminous.

It is a native of the Molucca and Philippine islands, frequents woody places, and feeds on fruits, and probably

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bably on insects. It almost constantly resides on trees; in descending from which it spreads its membranes, and balances itself in a gentle manner towards the place at which it aims, but in ascending it uses a leaping pace. It brings forth two young, which are said to adhere to the breasts of the parent by their teeth and claws.

Geoffroy and Cuvier make two varieties or species of this genus, viz. *G. Rufus*, Red Calugo; and *G. Variegatus*, Varied Calugo:—but these are probably no more than sexual differences.

38 Vespertilio.

Genus 4. VESPERTILIO. *Bats.*

Teeth erect, sharp-pointed, and approximated; hands palmated; with a membrane surrounding the body, and enabling the animal to fly.

The animals of this genus have their atlantal extremities exceedingly long, especially what may be termed the fingers: and the delicate membrane that is stretched over them is so contrived, as to form a wing when the animals wish to fly, and to fold up into a small space when they are at rest. All the species have two breasts, more or less conspicuous, to which the young adhere. They have no cæcum.

The Bats are natives of very different regions; three of them are found in Britain, and several in the warmer regions of Asia and Africa; one in the West Indies, and a few in America. Those of warm climates are usually very large. Those which inhabit the colder regions lie all winter in a torpid state, without tasting nourishment. The smaller species live chiefly on insects which they seize in their flight; but the larger attack birds, or even the lesser quadrupeds.

From some experiments made by the abbé Spallanzani, on three species of this genus, it appears that these animals possess some additional sense, by which they are enabled, when deprived of sight, to avoid obstacles as readily as when they retained the power of vision. When the eyes of these bats were covered, or even entirely destroyed, they would fly about in a darkened room, without striking against the walls, and would constantly suspend their flight, when they came near a place where they could conveniently perch. In the middle of a dark sewer that turned at right angles, they would, though at a considerable distance from the walls, regularly alter the direction of their flight with the greatest nicety, when they came to the angles. When branches of trees were suspended in the room in which they were flying, they always avoided them, and even flew betwixt threads hung perpendicularly from the ceiling, though these were so near each other that they were obliged to contract their wings in order to pass through them.

These experiments were repeated by Vassali at Turin, by Rossi at Pisa, Spadon at Bologna, and Jurin at Geneva. M. Jurin conceives that no other of the five senses could, in these instances, supply the place of sight: and as, from some anatomical observations that he made on these animals, he found a prodigious number of nerves expanded on the upper jaws, the muzzle, and the organ of hearing, he conceived that those nervous productions would account for the extraordinary faculty above described. From some observations made by Mr Carlisle on this subject, it appears probable that the sense of hearing, which in the bat is uncommonly delicate, enables those animals when blinded, to avoid those objects which would impede their flight. This gentleman collected several specimens of the vespertilio auritus or large-eared bat, and observed, that when the external ears of the blinded ones were closed, they hit against the sides of the room, without being at all aware of their situation. They refused every species of food four days, as did a larger number which were afterwards caught and preserved in a dark box for above a week. During the day time they were extremely desirous of retirement and darkness; and, while confined to the box, never moved or endeavoured to get out during the whole day; and, when spread on the carpet, they commonly rested some minutes, and then beginning to look about, crawled slowly to a dark corner or crevice. At sunset the scene was quite changed: every one then endeavoured to scratch its way out of the box; a continued chirping was kept up; and no sooner was the lid of their prison opened, than each was active to escape, either flying away immediately, or running nimbly to a convenient place for taking wing. When the bats were first collected, several of the females had young ones clinging to their breasts, in the act of sucking. One of them flew with perfect ease, though two little ones were thus attached to her, which weighed nearly as much as their parent. All the young were devoid of down, and of a black colour *.

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* *Shaw's Zoology*, vol. i.

Many of the larger species of bats attack men and other animals when asleep, make a slight wound with their sharp teeth so dexterously as not to awaken their victim, and then suck the blood. This property is attributed chiefly to one species, which we shall particularly notice presently; but it is probably possessed by most of the larger bats that inhabit the warm climates.

Some of the species may be employed as food.

There are described about 24 species of Bats; and as they are so numerous, they may be distributed into two sections, as the *tailed*, and the *tailless*.

A. TAILED BATS, of which there are 18; viz.

1. **Vespertilio murinus*, Common B. Nose inappendiculated; ears shorter than the head.—2. * *V. Auritus*, Long-eared B. Nose inappendiculated; ears larger than the head, and double.—3. *V. Noctula*, Noctule B. Nose and mouth simple; oval ears and very small valves.—4. *V. Ferrum equinum* Horse-shoe B. Nose horse-shoe shape; ears, valve lesser; tail half as long as the body.—5. *V. Serotinus*, Serotine B. Yellowish, with short emarginate ears.—6. *Pipistrellus*, Pipistrelle. Blackish brown, with convex front, and ovate emarginated ears, scarcely longer than the head.—7. *V. Barbastellus*, Barbastelle. Cheeks elevated, hairy; ears large, angulated below.—8. *Lasiopterus*, Lasiopter B. Membrane connecting the feet extremely broad, covered above with hair.—9. *V. Lasiurus*, Rough-tailed B. Lips tumid; tail broad and hairy.—10. *V. Cephalotes*, Molucca B. Yellowish gray, with large head; spiral nostrils, small valveless ears.—11. *V. Pictus*, Striped B. Nose simple; ears funnel-shaped, appendiculated.—12. *Noveboracensis*, New-York B. Tail long, rusty; nose short and sharp; ears short and round, with a white spot at the base of each wing.—13. *Hispidus*, Bearded B. Hairy, with channelled nostrils, and long narrow ears.—14. *V. Auripendulus*, Slouch-eared B. Nose blunt;

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blunt; ears large and pendent, with pointed tips.—15. *V. Lepturus*, Slender-tailed B. Nostrils tubular; tail slender, with a purse-shaped cavity on the inside of each wing.—16. *V. Nigrita*, Senegal B. Yellowish brown, with the forepart of the head, feet and tail black.—17. *V. Molossus*, Bull-dog B. Upper lip pendulous; tail stretching beyond the connecting membrane. 18. *V. Leporinus*, Peruvian B. Upper lip bifid.

B. Tailless Bats; of which there are 6; viz.

19. *V. Spasma*, Cordated B. A double heart-shaped leaf-like membrane on the nose.—20. *V. Soricinus*, Leaf B. Snout lengthened, furnished with a heart-shaped leaf-like membrane.—21. *V. Hastatus*, Javelin B. Nose furnished with a trefoil-shaped upright membrane.—22. *V. Nasutus*, Great Scrotine B. Rusty, with long sloping nose, and long upright rounded ears —23. *V. Spectrum*, Spectre B. Nose furnished with a funnel-shaped pointed membrane.—24. *Vampyrus*, Vampyre B. Nose without appendage; flying membrane divided between the thighs.

After having said so much on the general structure and habits of this genus, we shall briefly notice only two of the species.

39 *Auritus*, Long-eared Bat. Fig. 9.

Species 2. *V. Auritus*, Long-eared B.—This is one of the most common species of Britain, and may be seen flying through the air in the evenings of summer and autumn, in search of insects. It is about two inches long, and seven from the tip of one wing to that of the other. Its ears are half as long as its body, very thin, and almost transparent, and within each there is a membrane which probably serves as a valve to defend the organ of hearing during the inactive state of the animal. These bats are sometimes taken by throwing up at them the heads of hurdock whitened with flour. The animals either mistaking these for prey, or accidentally striking against them, are entangled by the hooked prickles, and brought to the ground. This is one of the species that remains in a torpid state during winter. At the end of summer they retire to their hiding places in old buildings, walls, or caverns, where they remain, generally in great numbers, suspended by the hind legs, and enveloped in their wings, till the genial warmth of summer again calls them forth. These animals are said to drink on the wing like swallows, and they love to frequent waters, partly for the sake of drinking, and partly to prey on the insects which hover over them. As Mr White was going pretty late on a warm summer's evening, in a boat on the Thames, from Richmond to Sunbury, he saw prodigious multitudes of bats between the two places; and he says, that the air swarmed with them all round the Thames, so that hundreds were in sight at a time. Bats are supposed to produce two young at a birth, and these they suckle for a considerable time. The young, when recently born, adhere most tenaciously to the nipple of the parent, so as not to be removed without great difficulty.

This animal is capable of being to a certain degree domesticated; and we are told by Mr White, that he was once much amused with the sight of a tame bat. "It would, says he, take flies out of a person's hand. If you gave it any thing to eat, it brought its wings round before the mouth; hovering and hiding its head in the manner of birds of prey when they feed. The adroitness it showed in shearing off the wings of flies (which were always rejected) was worthy of observation, and pleased me much. Insects seemed to be most acceptable, though it did not refuse raw flesh when offered; so that the notion that bats go down chimneys, and gnaw people's bacon, seems no improbable story. While I amused myself with this wonderful quadruped, I saw it several times confute the vulgar opinion, that bats, when down on a flat surface, cannot get on the wing again, by rising with great ease from the floor. It ran, I observed, with more dispatch than I was aware of, but in a most ridiculous and grotesque manner *."

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* White's Selborne.

Species 24. *V. Vampyrus*. Vampyre Bat.—This is one of the largest species, being about a foot long, and nearly four feet in the extent of its wings; it is sometimes found even larger, and of the extent of six feet between the wings. Its colour is generally a deep reddish brown; its head is shaped like that of a fox, the nose being sharp and black, and the tongue pointed, and terminated by sharp prickles. The ears are naked, flattish, and pointed; and in colour resembling those of the common bat. These animals are said not to be carnivorous, but live principally upon fruit; and are so fond of the juice of the palm tree, that they will suck it till they are intoxicated, and fall motionless to the ground. They often hang together in vast clusters in hollow trees, or from the boughs of trees, and make a horrid noise. They are found in the Friendly islands, New-Holland, in South America, and in the East Indies.

40 *Vampyrus*, Vampyre Bat. Fig. 10.

Linnæus has given to this species the name *Vampyrus*, from the idea that this is the principal species that sucks the blood of people when asleep. It is not certain whether the bat by which Captain Stedman was attacked, while in Surinam, be this species; but his account of the accident is so diverting, that we shall give it in his own words. "I cannot here (says he) forbear relating a singular circumstance respecting myself, viz. that on waking about four o'clock one morning in my hammock, I was extremely alarmed at finding myself weltering in congealed blood, and without feeling any pain whatever. Having started up, and rung for the surgeon, with a fire-brand in one hand, and all over besmeared with gore; to which, if added, my pale face, short hair, and tattered apparel, he might well ask the question,

'Be thou a spirit of health, or goblin damn'd,
Bring with thee airs from heaven, or blasts from hell?'

"The mystery, however, was, that I had been bitten by the *vampire* or *spectre* of Guiana, which is called the *flying-dog* of New Spain, and by the Spaniards, *perro volador*: this is no other than a bat of a monstrous size, that sucks the blood from men and cattle while they are fast asleep, even sometimes till they die; and as the manner in which they proceed is truly wonderful, I shall endeavour to give a distinct account of it.—Knowing by instinct, that the person they intend to attack is in a sound slumber, they generally alight near the feet, where, while the creature continues fanning with his enormous wings, which keeps one cool, he bites a piece out of the tip of the great toe, so very small indeed, that the head of a pin could scarcely

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scarcely be received into the wound, which is consequently not painful; yet through this orifice he continues to suck the blood, until he is obliged to disgorge. He then begins again, and thus continues sucking and disgorging till he is scarcely able to fly, and the sufferer has often been known to sleep from time into eternity. Cattle they generally bite in the ear, but always on places where the blood flows spontaneously. Having applied tobacco ashes as the best remedy, and washed the gore from myself and hammock, I observed several heaps of congealed blood all round the place where I had lain, upon the ground; on examining which, the surgeon judged that I had lost at least 12 or 14 ounces of blood during the night *."

* *Stedman's Narrative.*

The flesh of this species is considered by the Indians as excellent food, and it is said that the French residents sometimes boil them in their bouillon *to give it a relish.*

From the general appearance and usual time of flight of bats, they have always been looked on with a sort of superstitious terror, and are commonly introduced as principal objects in those awful scenes of haunted castles, and mysterious caverns, that have exercised the fancy of poets and romantic writers. The bat has been represented by the ancient epic poets as one of the inhabitants of that dreary vault that forms the entrance to the infernal regions; and it has from time immemorial lent its wings to decorate the shoulders of those terrific figures under which the ingenious fancy of painters has represented imps and dæmons. Probably the fabulous harpies of the ancient poets may be traced to a similar origin, as some of the larger bats may with a little poetical exaggeration, easily be converted into those rapacious and filthy beings.

This first order contains four genera, and about 100 species.

Chap. II. BRUTA.

Genus 5. Bradypus. *Sloths.*

41 Bradypus.

Cutting teeth wanting in both jaws; canine teeth single, obtuse, longer than the grinders, and placed opposite; grinders five on each side, obtuse; fore legs by much the longer; claws very long.

The animals of this genus are called *sloths*, as their movements, more especially those of one species, are very slow and sluggish. There are but three species, two of which are natives of South America, and the third of India. They all live chiefly on vegetable food, and are mild harmless creatures. They are thus distinguished.

1. *B. Tridactylus*, Three-toed S. Feet three-toed; tail short.—2. *B. Didactylus*, Two-toed S. Tailless; fore feet two-toed.—3. *B. Ursinus*, Ursine S. Black, with very long shaggy hair; long snout, and five toed feet.

We shall here give an account only of the first species, or the Three-toed S.

42 *Tridactylus.* Three-toed Sloth.

Bradypus Tridactylus. This animal is remarkable for its slow movements, affording almost a singular example of languid motion and habitual inactivity. The following account of it is given us by Kircher. "Its figure is (he says) extraordinary: it is about the size of a cat, has a very ugly countenance, and claws extended like fingers. It sweeps the ground with its belly, and moves so slowly that it would scarcely go the length of a bow-shot in 15 days, though constantly in motion; hence it obtained the name of sloth. It lives generally on the tops of trees, and employs two days in crawling up, and as many in getting down again. Nature has doubly guarded it against its enemies, first, by giving it such strength in its feet, that wherever it seizes, it holds so fast, that it can never be freed, but must there die of hunger. 2dly, In having given it such an affecting countenance, that when it looks at any one who might be tempted to injure it, it is almost impossible not to be moved with compassion; it also sheds tears, and upon the whole persuades one that a creature so defenceless and so abject ought not to be tormented.

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"To try an experiment with this animal, the provincial had one of them brought to the Jesuit's college at Carthagena. He put a long pole under its feet, which it seized very firmly, and would not let go again. The animal, therefore, thus voluntarily suspended, was placed between two beams, where it remained without food for 40 days, the eyes being always fixed on those who looked at it, who were so affected that they could not forbear pitying its dejected state. At length, being taken down, a dog was let loose on it: this, after a while the sloth seized in its claws, and held till he died of hunger."

The slowness of its motions is, in the above account greatly exaggerated, as we are informed by later writers that it will move fifty or sixty paces in a day, and one that was on board ship climbed to the mast head in about an hour.

In ascending a tree, this animal first carelessly stretches out one of its fore paws, and fixes its claws in the bark of the tree, as high as it can reach, then heavily raises its body, and gradually fixes its other paw, thus ascending with the greatest slowness and apparent difficulty. When got up into the tree, he continues there till he has despoiled it of every thing that can serve him for food, and then to save himself the trouble of a tedious and difficult descent, it is said he suffers himself to drop from the tree upon the ground, being safe from any injury in the fall by his very tough and hairy skin. Here he remains till the calls of hunger again incite him to the arduous task of climbing another tree, when he proceeds in the same manner.

The female produces only one young, which she frequently carries on her back. This animal is a native of the hotter parts of South America.

In Dr Shaw's description of this species, it is remarked, that "the fore legs are *short*, the hinder ones far longer." As this contradicts the generic character, and is different from the other descriptions that we have read of the three-toed sloth, we suppose it to be an inadvertency, though Mr Bingley has copied the passage without remarking its incongruity.

The third species, or *ursine sloth*, is the same animal that is figured in Mr Bewick's History of Quadrupeds, p. 266, (2d edit.) and which was by him considered as a species of bear.

43 Megatherium.

Megatherium. Some years ago, there was discovered below the surface of the earth in South America, an entire fossil skeleton of an animal at present unknown; but which M. Cuvier found to resemble the present

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present genus more than any other. From its vast size, Cuvier gave it the name of *megatherium*, (μεγα θηριον, *great wild beast*), and he has given the following description of it in the "*Annales de Museum National*," accompanied with a figure.

"This skeleton is twelve feet (French) long, by six feet in height. The spine is composed of seven cervical, 16 dorsal, and four lumbar vertebræ; it has consequently sixteen ribs. The sacrum is short; the ossa ilia very broad, and their plane being almost perpendicular to the spine, they form a very open pelvis. There is no pubis or ischium, at least they are wanting in this skeleton, and there is no mark of their having existed when the animal was alive.

"The thigh bones are excessively thick, and the leg bones still more so in proportion; the entire sole of the foot bore on the ground in walking; the shoulder blade is much broader than long; the clavicles are perfect, and the two bones of the fore arm are distinct and moveable upon each other; the fore limbs are longer than the hind. To judge by the form of the last phalanges, there must have been very large pointed claws, enclosed at their origin in a long sheath. There appears to have been only three of these claws on the fore feet, and a single one on the hind; the other toes seem to have been deprived of them, and perhaps, entirely concealed beneath the skin.

"The head is the greatest singularity of this skeleton; the occiput is elongated and flattened, but is pretty convex above the eyes; the two jaws form a considerable projection, but without teeth, there being only four on each side above and below, all grinders, with a flat crown, and grooved across; the breadth of the branches of the lower jaw, and the great apophysis placed on the base of the zygomatic arch, deserve particular notice.

This quadruped, in its characters, taken together, differs from all known animals, and each of its bones, considered apart, also differs from the corresponding bones of all known animals. This results from a detailed comparison of the skeleton with that of other animals, and will readily appear to those who are conversant in such researches; for none of the animals which approach it in bulk have either pointed claws, or similarly formed head, shoulder blades, clavicles, pelvis, or limbs *."

* Vid. *Annales de Museum National.*

44 Myrmecophaga.

Genus 6. Myrmecophaga. *Ant-eaters.*

Teeth wanting; tongue cylindrical and extensile; mouth lengthened out so as to be somewhat of a tubular form; body covered with hair.

The *ant-eaters*, as their name imports, live chiefly on ants and similar insects, and for this purpose they are furnished with a very remarkable tongue, it being of great length and of a roundish or worm-like form, and covered with a very glutinous saliva. This tongue the animals thrust into the nests of the ants, &c. and when a sufficient number of the insects has adhered to it, they withdraw the tongue and swallow the prey. Though the want of teeth makes part of the generic character, it appears from the observations of M. Bronssonet, that in most of the species there are certain bones or processes not unlike teeth, situated at the entrance of the gullet, or rather, according to Camper, at the lower end of the jaws. The ant-eaters are confined to warm climates, and most of them have hitherto been found only in South America. Bruta.

There are seven species described by Shaw, though Gmelin admits only five.

1. *M. Jubata* Great A. Gray brown; with four toes on the fore feet, five on the hind; long snout, and very long bushy tail.—2. *M. Tetradactyla*, Middle A. Four toes on the fore, and five on the hind feet, and half naked, prehensile tail.—3. *M. Tridactyla*, Three-toed A. Three toes on the fore, and four on the hind feet, and villose tail.—4. *M. Didactyla*, Little A. Two toes on the fore, and four on the hind feet, and prehensile tail.—5. *M. Capensis*. Cape A. Four toes on the fore feet; long snout; large pendant ears; tail shorter than the body, and attenuated towards the tip.—6. *M. Aculeata*, Spiny A. Tail very short.—7. *M. Striata*, Striped A. Yellowish, with transverse dusky bands, and the upper jaw longer than the lower.

Of the above seven species, it is probable that the third is only a variety of the second; and M. M. Cuvier and Geoffroy have placed the fifth in a new genus, *orychteropus*, (see p. 451.) as it differs so considerably from the rest. Most naturalists agree that the spines on the body of the sixth entitle it, equally with the genus Manis, to a separate place in systematic arrangement. On the whole, from an extensive consideration of this tribe, M. La Cepede is of opinion that only three species should be admitted into it, viz. the first, second, and fourth. Of these the first and fourth are best known; the second, or what Cepede calls *tamandua-i*, or *little tamandua*, has been well described by this naturalist in a memoir on the genus Myrmecophaga, printed in the sixth volume of "*Memoires de l'Institut.*"

Genus 7. Manis.

45 Manis.

Teeth wanting; tongue cylindrical and extensile: mouth lengthened into a narrow snout; body covered with scales.

This genus is nearly allied to the last, differing in little more than in the nature of the covering of the body, which in this is composed of large scales that are of a horny consistence, and extremely strong, constituting a suit of armour that is capable of defending the animals, when rolled up, against the attacks of the most ferocious enemies. The animals have the power of raising these scales; thus presenting to the assailants a most formidable front. From some distant resemblance to the lizard tribe (see Erpetology), the animals of this genus have been called *scaly lizards*, but they are more commonly known by the name of *pangolins*. They are harmless creatures, and feed on similar food with the ant-eaters, taking it in the same manner. They are found in India and the Indian islands.

There are only two, or at most three species, viz. 1. *M. Tetradactyla*, Long-tailed M, or Phatagin. Feet four-toed, and tail very long.—2. *M. Pentadactyla*, Short-tailed M, or *Pangolin*. Feet five-toed, and tail about as long as the body.—3. *M. Platurus*, Broad-tailed M. Tail extremely broad.

It is doubtful whether the last be a distinct species, or only a variety, the effect perhaps of advanced age.

Bruta.

So little is known of the habits and manners of these animals that we shall not dwell longer on them.

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Genus 8. Dasypus. *Armadillos.*

46 Dasypus or *Armadillo.*

Cutting and canine teeth wanting; grinders several; body covered with a shelly armour, divided into zones or bands.

The animals of this tribe are called *armadillos*, from the very singular *armour*, by which the upper part of their bodies is defended. This is composed partly of large irregular pieces covering the shoulders and rump, and partly of regular bands lying between these, and folding one over another, like the parts of a lobster's tail, so as to accommodate themselves to all the motions of the animal. The number of these bands varies in the several species; and though this circumstance makes part of the specific characters, it is doubtful whether it is sufficiently constant or exact, as various authors have numbered them very differently. The armadillos resemble each other so much in their habits and way of life, that a general account of them may suffice.

They are very harmless animals, and live retired in subterraneous retreats, which they burrow for themselves by means of the large strong claws with which their feet are furnished. They wander about chiefly by night, in search of roots, grain, worms, insects, and other small animals; when attacked, they coil themselves up in a ball like the pangolins, and are then invulnerable. They are said to drink much, and often grow very fat. They are very prolific, breeding three or four times in a year, and producing several young at a birth. They are all natives of South America, and are considered as excellent food. The Indians hunt them with small dogs trained for that purpose. When surprised, they run to their holes, or attempt to make a new one, which they do with great expedition, having strong claws on their fore feet, with which they adhere so firmly to the ground, that if they should be caught by the tail whilst making their way into the earth, their resistance is so great, that they will sometimes leave their tails in the hand of their pursuers: to avoid this, the hunter has recourse to artifice; and, by tickling the animal with a stick, it gives up its hold, and suffers itself to be taken alive. If no other means of escape be left, it rolls itself up within its covering, by drawing in its head and legs, and bringing its tail round them, as a band to connect them more forcibly together: in this situation it sometimes escapes by rolling itself over the edge of a precipice, and generally falls to the bottom unhurt.

The most successful method of catching armadillos is by snares laid for them by the sides of rivers or other places which they frequent.

There are six species of armadillos, that are, as we have said, chiefly distinguished by the number of shelly bands that envelope the middle part of their body.

1. *Dasypus Tricinctus.* Three-banded A. Armour divided into three bands, and five-toed feet.—2. *D. Sexcinctus*, Six-banded A. Six bands, and five-toed feet.—3. *D. Septemcinctus*, Seven-banded A. Seven bands, and fore feet four-toed, hind feet five-toed.—4. *D. Novemcinctus*, Nine-banded A. Nine bands; fore feet four-toed, hind feet five-toed.—5. *D. 12-cinctus*, 12-banded A. Twelve bands.—6. *D. 18-cinctus*, Eighteen-banded A. Eighteen bands.

Genus 9. Rhinoceros.

47 Rhinoceros.

Horn solid, perennial, conical, seated on the nose.

There are at least two species, viz. *R. Unicornis*, Single-horned R. with a single horn, and, 2. *R. Bicornis*, Two-horned R. with two horns.

As both species are remarkable, both for their form and habits, we shall describe both pretty much at large.

48 *Unicornis.* Single-horned Rhinoceros.

1. *R. Unicornis*, Single-horned rhinoceros. This animal, if we except the elephant, is the largest of all terrestrial animals, and in strength and power it is exceeded by none. It is generally about 12 feet long, and nearly as many in the circumference of its body. Its whole form is very awkward and clumsy; its head is large and long; its back sinks in considerably, and its skin is puckered up into several folds, giving the animal the appearance as if it were invested with a coat of mail. The upper lip hangs over the lower in the form of a lengthened tip, which seems to answer the purpose of a small proboscis, and, being extremely pliable, is useful to the animal in taking hold of the shoots of vegetables, and delivering them into the mouth. The horn is situated on the nose, and is slightly curved, sharp pointed, and very strong, and is sometimes three feet long, and 18 inches round at the base. This horn the rhinoceros uses both as an offensive and defensive weapon, by which it is completely armed against the attacks of the most ferocious animals, who cannot face it without danger of having their bowels torn out. The Roman epigrammatist, Martial, long ago remarked, that with this horn the rhinoceros could lift up a bull as easily as a foot-ball. The ears are pretty large, upright and pointed; the eyes small. The skin is naked, very rough, and marked with numerous large callous granulations; it is destitute of hair, except a few straggling coarse bristles on some parts of the head. The folds of the skin are very remarkable, and are disposed in various parts of the body in a singular manner. There is one large plait about the neck, another passing through the shoulders to the fore legs, and a third from the hind part of the back to the thighs. The belly is pendulous like that of a hog; the legs are very short, strong and thick; and the feet marked with three large hoofs all standing forwards. The tail is slender, flattened at the end, and covered on the sides with very stiff, thick, black hairs (c).

This animal is a native both of the continent of Asia, and of several of the islands in the Indian ocean, especially Ceylon, Java, and Sumatra; and is sometimes found in Ethiopia. It usually resides in cool sequestered

(c) For an accurate osteological account of this species, with a figure of his skeleton by Cuvier, see *Annales de Museum National*, N° 13, or Philosophical Magazine, vol. xix.

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questered spots near waters and in shady woods, and delights to roll itself in the mud. It seems to live entirely on vegetables.

The sight of this animal is but indifferent; but he is said to possess an acute and most attentive ear, and to listen with a deep, long-continued attention to any kind of noise. It is generally of a quiet inoffensive disposition, but when provoked or attacked, he becomes furious and implacable. He is even said to be subject to paroxysms of rage which nothing can allay. One that was sent as a present to the pope by Emmanuel king of Portugal in 1513, destroyed the vessel in which they were transporting it. He runs with great swiftness, and from his prodigious strength rushes with resistless violence through woods, and over every obstacle, bending the small trees as he passes like so many twigs.

The female produces but one young at a birth, but its time of gestation is not certainly known.

The flesh of this animal is eaten by the natives, who often engage in hunting parties against it. It is a difficult matter to kill the rhinoceros, its skin being so hard that an ordinary leaden bullet will not pierce it, and they are obliged to use iron bullets for that purpose. The horn is employed for many useful purposes, especially for making drinking cups, which are used by the Indian princes, under an idea that if any poisonous liquor is poured into them, it will ferment and boil over the top. Professor Thunberg tried several of these horns, both of old and young animals, wrought into goblets and unwrought, with several poisonous liquors, both weak and strong, without observing any effervescence; but on pouring a solution of corrosive sublimate into one of them, there arose a few bubbles, which he supposes to have been inclosed in the pores of the horn, and disengaged from them by the liquor. The skin is also employed by the Javanese for making shields, and in some parts of India almost every part of the animal is used medicinally.

Several of these animals have been brought into Europe. Buffon gives an account of one, and Dr Parsons has given a particular description of one that was brought to England from Bengal. This animal was only two years old, and yet consumed so much food, that his voyage cost 1000l. He had every day at three meals seven pounds of rice mixed with three pounds of sugar, besides hay and green plants, and he drank large quantities of water. He was in general, very quiet and peaceable, readily suffering people to touch every part of his body; but when hungry, or when struck, he became very mischievous, and nothing would appease him but food. At this time he was about the size of a young cow.

In the year 1748, there was exhibited at Paris a rhinoceros brought from the kingdom of Ava. It was very tame, gentle, and even caressing; was fed principally on hay and corn; and was much delighted with sharp or prickly plants, and the thorny branches of trees. The attendants frequently gave him branches that had very sharp and strong thorns on them; but he bent and broke them in his mouth without seeming in the least incommoded. It is true they sometimes drew blood from the mouth and tongue, but that, says Father Le Comte, who gives us the description, might even render them more palatable, and those little wounds might serve only to cause a sensation similar to that excited by salt, pepper, or mustard on ours.

Bruta.

The rhinoceros is even sometimes domesticated, and brought into the field of battle by the Asiatics, in order to terrify their enemies; but he is so unmanageable, that his use seems to be attended with more disadvantage than benefit, and when wounded, they are as likely to turn on their masters as on the enemy.

49 *Bicornis.* Two-horned Rhinoceros.

R. Bicornis, Two-horned rhinoceros. In size, and in many of its general habits, this species greatly resembles the former, but differs much in its external appearance, as the skin, instead of the regularly marked folds in that, has only a slight wrinkle across the shoulders, and on the hind parts, so as, in comparison with the other species, to appear almost smooth, though its surface is rough and tuberculated, especially in the larger specimens. It is chiefly distinguished, however, by the two horns, one smaller than the other, and situated higher up on the front. These horns are said to be loose when the animal is quiet, but to become fixed and immoveable when he is in an enraged state. Dr Sparrman has observed that these horns are fixed to the nose by a strong apparatus of muscles or tendons, so as to enable the animal to fix or relax them at pleasure, and on inspecting the horns and skin on which they are seated, it does not appear that the horns are firmly attached to the skull bone, or closely connected with it.

This species is found in various parts of Africa, and appears to have been that which was introduced by the Romans into their public shows.

Mr Bruce has given us an account of this animal, which is highly interesting. He says, that besides the trees capable of most resistance, there are in the vast forests within the rains, trees of a softer consistence, and of a very succulent quality, which seem to be destined for his principal food. For the purpose of gaining the highest branches of these, his upper lip is capable of being lengthened out so as to increase his power of laying hold with it, in the same manner as the elephant does with his trunk. With this lip, and the assistance of his tongue, he pulls down the upper branches, which have most leaves, and these he devours first; having stripped the tree of its branches, he does not therefore abandon it, but placing his snout as low in the trunk as he finds his horns will enter, he rips up the body of the tree, and reduces it to thin pieces like so many laths; and when he has thus prepared it, he embraces as much of it as he can in his monstrous jaws, and twists it round with as much ease as an ox would do a root of celery, or any such pot herb or garden stuff.

When pursued, and in fear, he possesses an astonishing degree of swiftness, considering his size, the apparent unwieldiness of his body, his great weight before, and the shortness of his legs. He is long, and has a kind of trot, which after a few minutes increases in a great proportion, and takes in a great distance; but this is to be understood with a degree of moderation. It is not true, that in a plain he beats the horse in swiftness. Mr Bruce has passed him with ease, and seen many worse mounted do the same; and though it is certainly true that a horse can seldom come up with him, this is owing to his cunning, and not to his swiftness. He makes constantly from wood to wood, and forces himself into

Bruta. the thickest parts of them. The trees that are dead or dry, are broken down, as with a cannon shot, and fall behind him and on his side in all directions. Others that are more pliable, greener, or fuller of sap, are bent back by his weight and the velocity of his motions: and after he has passed, restoring themselves like a green branch to their natural position, they often sweep the incautious pursuer and his horse from the ground, and dash them in pieces against the surrounding trees.

The eyes of the rhinoceros are very small; he seldom turns his head, and therefore sees nothing but what is before him. To this he owes his death, and never escapes if there be so much plain as to enable the horse to get before him. His pride and fury then make him lay aside all thoughts of escaping but by victory over his enemy. He stands for a moment at bay; then at a start runs forward at the horse like a wild boar, which in his manner of action he very much resembles. The horse easily avoids him by turning to one side, and this is the fatal instant; the naked man with the sword drops from behind the principal horseman, and unseen by the rhinoceros, who is seeking his enemy the horse, he gives him a stroke across the tendon of the heel, which renders him incapable of further flight or resistance.

In speaking of the great quantity of food necessary to support this enormous mass, we must likewise consider the vast quantity of water which he needs. No country but that of the Shangalla, which he possesses, deluged with six months rain, and full of large deep basons made in the living rock, and shaded by dark woods from evaporation, or watered by large and deep rivers, which never fall low or to a state of dryness, can supply the vast draughts of this monstrous creature: but it is not for drinking alone, that he frequents wet and marshy places; large, fierce, and strong as he is, he must submit to prepare himself against the weakest of all his adversaries. The great consumption he makes of food and water necessarily confine him to certain limited spaces; for it is not every place that can maintain him; he cannot emigrate or seek his defence among the sands of Atbara.

This adversary is a fly (probably of the genus OESTRUS) which is bred in the black earth of the marshes: it persecutes him so unremittingly, that it would in a short time entirely subdue him, but for a stratagem which he practises for his preservation. In the night when the fly is at rest, the rhinoceros chooses a convenient place, and there rolling in the mud, clothes himself with a kind of case, which defends him against his enemy for the following day. The wrinkles and folds of his skin serve to keep this muddy plaister firm upon him, except about his hips, legs, and shoulders, where by motion it cracks and falls off, leaving him exposed to the attacks of the fly. The itching and pain which follow, occasion him to rub himself in those parts against the roughest trees, and this is supposed to be one cause of the numerous pustules or tubercles which we see upon him.

He seems to enjoy the rubbing of himself very much, and groans and grunts so loud during this action that he is heard at a considerable distance. The pleasure he receives from this enjoyment, added to the darkness of the night, deprives him of his usual vigilance and attention. The hunters guided by his noise, steal secretly on him; and while lying on the ground, wound him with their javelins, mostly in the belly, where the wound is mortal. History of the Species.

It is by no means true that the skin of the rhinoceros, as it has been often represented, is hard and impenetrable like a board. In his wild state he is easily killed by javelins thrown from different hands, some of which enter many feet into his body. A musket shot will go through him, if it meet not with the intervention of a bone; and the Shangalla, an Abyssinian tribe, kill him by the worst and most inartificial arrows that ever were used by any people practising that weapon, and cut him to pieces afterwards with the very worst of knives.

To shew the amazing strength of the rhinoceros, even after being severely wounded, we shall quote Mr Bruce's account of the hunting of this animal in Abyssinia. "We were on horseback (says this gentleman) by the dawn of day in search of the rhinoceros, many of which we had heard making a very deep groan and cry as the morning approached. Several of the agageers (hunters) then joined us, and after we had searched about an hour in the very thickest part of the wood, one of them rushed out with great violence, crossing the plain towards a wood of canes that was about two miles distance. But though he ran, or rather trotted, with surprising speed considering his bulk, he was in a very little time transfixed with 30 or 40 javelins, which so confounded him that he left his purpose of going to the wood, and ran into a deep hole or ravine, a *cul de sac*, without outlet, breaking above a dozen javelins as he entered. Here we thought he was caught as in a trap, for he had scarce room to turn, when a servant who had a gun standing directly over him, fired at his head, and the animal fell immediately to all appearance dead. All those on foot now jumped in with their knives to cut him up; and they had scarce begun, when the animal recovered so far as to rise upon his knees: happy then was the man that escaped first; and had not one of the agageers who was himself engaged in the ravine, cut the sinews of the hind leg as he was retreating, there would have been a very sorrowful account of the foot hunters that day.

"After having dispatched him, I was curious to see what wound the shot had given which had operated so violently upon so huge an animal, and I doubted not it was in the brain; but it had struck him no where but upon one of the horns, of which it had carried off above an inch, and this occasioned a concussion, that had stunned him for a minute till the bleeding had recovered him."

It has been often asserted that the tongue of the rhinoceros is so hard and rough as to take away the skin and flesh wherever it licks any person that has unfortunately fallen a victim to its fury. Dr Sparrman says, however, that he thrust his hand into the mouth of one that had just been shot, and found the tongue perfectly smooth and soft.

Fossil bones have been found below the earth in Siberia that seem to belong to a third species of rhinoceros, differing from the two above mentioned in having a longer head, and in the partition between the nostrils being otherwise shaped. It seems also to have had two horns. In 1772 a specimen was dug up

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almost entire, with the flesh and skin not yet quite corrupted.

50 Elephas.

Genus 10. Elephas.

No cutting teeth in either jaw, very long tusks in the upper jaw; nose ending in a very long prehensile proboscis; body nearly naked.

51 *Maximus.* Elephant. Fig. 17.

We know of only one species, which has been called *elephas maximus*. Of all the animals that have engaged the attention of mankind from the earliest times, none has been so much, or perhaps so deservedly celebrated as the elephant. Possessed of magnitude and strength superior to all other quadrupeds, he is more gentle and tractable than almost any of them, and in sagacity and obedience to the commands of man, he is not excelled by any, except perhaps the dog.

The usual height of the elephant is nine or ten feet, though he is said to be sometimes found at least twelve feet high (D). His body is of a very clumsy and awkward form; his head very large; his back very much arched, and his legs very short, and extremely thick. His eyes are very small; but his ears large, pendulous, and irregularly waved about the edges. His trunk may be considered as one of the most wonderful instruments with which nature has gifted her most favoured animals, being little inferior in flexibility and utility, even to the hand of man. This organ appears to be composed of a great number of flexible rings, forming a double tube, ending in a circular tip that is somewhat flattened, and furnished with a projecting point, or fleshy moveable hook, of exquisite sensibility, and so pliable, that by means of it the animal can pick up from the ground almost the smallest object. Its lower surface is somewhat flattened, and it is circularly formed on the upper. The trunk is the principal organ of breathing to the elephant, being terminated by two orifices that are the nostrils. By means of this tube he supplies himself with food, taking hold of it with the trunk, and conveying it into his mouth. He drinks by sucking up the water into his trunk, and then pouring it into his mouth. The skull of the elephant is extremely thick, but not solid, there being a number of cavernous cells between the outer and inner laminæ. The feet of this animal are edged with five rounded hoofs; the tail is of a moderate length, and is terminated by a few scattered hairs, very thick, and of a black colour. The general colour of the skin is a dusky or blackish brown, but in some parts of India they are found of a white colour, though this is a rare occurrence.

The teeth of the elephant deserve particular notice, as, till lately, our information respecting them was very imperfect. It has long been known that the females either seldom have tusks, or that in them these are very short. The tusks of the male are sometimes of an immense length, those brought from the Mosambique and Cochin China having been seen 10 feet long. Mr Scot has given us the best account of the elephant's teeth; and we shall extract some of the most interesting particulars from his paper, which appeared in the Philosophical Transactions for 1799. Bruta.

The tusks in some female elephants are so small as not to appear beyond the lip, whilst in others they are almost as large and long as in one variety of the male, called mooknah. The grinders are so much alike in both sexes, that one description may serve for both. The largest tusks, and from which the best ivory is supplied, are taken from that kind of male elephant, called dauntelah from this circumstance, in opposition to the mooknah, whose tusks are not larger than those of some females. In one variety of the elephant the tusks point downwards, projecting only a little way beyond the trunk. The tusks in elephants are fixed very deep in the upper jaw; and the root or upper part, which is hollow, and filled with a core, goes as high as the insertion of the trunk, round the margin of the nasal opening to the throat; which opening is just below the protuberance of the forehead. Through this opening the elephant breathes, and by its means he sucks up water into his trunk: between it and the roots of the tusks there is only a thin bony plate. The first or milk-tusks of an elephant never grow to any considerable size, but are shed between the first and second year, when not two inches in length. The time at which the tusks cut the gum varies considerably: sometimes a young elephant has his tusks at five months old, and sometimes not till seven. Even in a fœtus which has arrived at its full time, these deciduous tusks are formed. A young elephant shed one of his milk-tusks on the 6th of November, 1790, when about 13 months old, and the other on the 7th of December, when above fourteen months old. Two months afterwards the permanent ones cut the gums, and on the 19th of April, 1791, they were an inch long. Another young elephant did not shed his milk-tusks till he was 16 months old, which proves that the time of this process varies considerably. The permanent tusks of the female are very small compared with those of the male, and do not take their rise so deep in the jaw. The largest elephant tusks Mr Scot ever saw in Bengal did not exceed the weight of 72 pounds avoirdupois; and at Tiperah they seldom exceed 50 pounds each. Both these weights are very inferior to that of the tusks brought from other parts to the India house, where some have weighed 150 pounds each. These, Mr Scot suspects, were from Pegu. The African elephant is said to be smaller than the Asiatic; yet the ivory dealers in London affirm that the largest tusks come from Africa, and are of a better texture, and less liable to turn yellow, than the Indian ones. The increase of the tusks arises from circular layers of ivory, applied internally, from the core on which they are formed, similar to what happens in the horns of some animals.

The grinders of elephants may be considered as composed of several distinct laminæ or teeth, each covered

(D) There is little doubt that the accounts generally given of the great height of the elephant have been much exaggerated. To John Corse Scot, Esq. F. R. S. naturalists are greatly indebted for clearing up many circumstances relating to this animal. That gentleman declares that he never saw an elephant above ten feet high, and that the highest of which he could procure any authentic account did not exceed ten feet six inches.

Bruta. vered with its proper enamel; and these teeth are merely joined to each other by an intermediate softer substance, acting as a cement. This structure, even at the first glance, must appear very curious, being composed of a number of perpendicular laminæ, which may be considered as so many teeth, each covered with a strong enamel, and joined to one another by the common osseous matter: this, being much softer than the enamel, wears away faster by the mastication of the food; and in a few months after these teeth cut the gum, the enamel rises considerably higher, so that the surface of each grinder soon acquires a ribbed appearance, as if originally formed of ridges. The number of these teeth or portions, of which an elephant's grinder is composed, varies from four to 23, according as the animal advances in age; so that a grinder or case of teeth in a full grown elephant is more than sufficient to fill one side of the mouth. The shape of the grinders of the lower jaw differs from those of the upper, which are very convex on the back part; whereas the lower has a bent or curved direction, adapting itself to the shape of the jaw, and is concave on the surface. The grinders, like the tusks, are already formed, even in the very young animal. The first set of grinders, or milk-teeth, begin to cut the gum eight or ten days after birth; they are not shed or cast, as the milk-tusks are, but are gradually worn away during the time the second set are coming forward. Mr Scot could not ascertain the exact time at which the second set of grinders make their appearance; but when the elephant is two years old, the second set are then completely in use. At about this period the third set begins to cut the gum; and from the end of the second to the beginning of the sixth year, the third set comes gradually forward as the jaw lengthens, not only to fill up this additional space, but also to supply the place of the second set, which are during the same period gradually worn away, and their fangs or roots absorbed. From the beginning of the sixth to the end of the ninth year, the fourth set of grinders comes forward, to supply the gradual waste of the third set. After this period other sets are produced, but in what time, and in what proportion, is not yet ascertained; but it is reasonable to conclude, that every succeeding grinder takes a year longer than its predecessor to be completed; and consequently, that the fifth, sixth, seventh, and eighth set of grinders will take from five to eight years (and probably much longer) each set, before the posterior lamina has cut the gum.

The time of gestation of the female elephant has been much disputed. Aristotle stated it at two years, and Buffon was at one time led to fix the same period. Afterwards, however, this naturalist was induced to consider nine months as the most likely time, and in this he was followed by Mr Pennant. We are indebted to Mr Scot for setting us right in this particular also; that gentleman having ascertained by actual experiment, that the female goes with young nearly twenty-one months.

It is now fully proved that the elephant will readily breed in captivity, and that neither male nor female shew those signs of modesty and shyness which have been attributed to them. Mr Scot has repeatedly witnessed the ceremony.

M. Buffon was led to conceive that elephants could not copulate in the situation that is customary to other quadrupeds, but this Mr Scot has also found to be an error. The young when first born is about three feet high, and continues growing for 16 or 18 years. The female has two teats a little behind the fore legs. It was supposed by Buffon, that the young elephant sucked by means of its trunk, but later observations have shewn, that they suck in the usual way with their mouth, using the trunk for grasping the dug of the mother to press out the milk. History of the Species.

Mr Scot corrects another mistake, respecting the fondness of the female for her young. It was supposed that this was most exemplary, and that she would defend her young with her life; but Mr Scot relates an instance where females suffered their young to be gored to death by a male elephant, without attempting to protect or rescue them.

It has not yet been ascertained how long an elephant usually lives in its native forests. In captivity they are said to live above 100 years.

The elephant is found on the continent of Asia, in several of the Asiatic islands, especially Ceylon, and in the southern part of Africa. The Ceylonese elephants are, in general, larger than those of Africa. Captain Beaver informs us, that the little island of Bulama (on the western coast of Africa) abounds with them. He says "the number of these animals on this little island almost exceeds belief; it was nearly impossible for us to proceed fifty yards inland without meeting recent and palpable vestiges of them, and the skeletons of old ones that had died in the woods are frequently found." They often pass over the arm of the sea from the continent to this island; but, what is very extraordinary, they have never been observed to return to the continent *.

The ordinary food of the elephant consists of herbs, roots, leaves, and the tender branches of trees, which he breaks off with his trunk. As he is not a ruminating animal, he has only one stomach; but the extent of his bowels is very considerable, the colon alone being 15 or 20 feet long, and two or three in diameter. When an elephant discovers a plentiful pasture, he calls his neighbours together, to partake with him of the feast. They feed together in considerable herds, and as they require a large quantity of fodder, frequently shift their situation. They usually march in troops, the oldest keeping foremost, and the middle-aged bringing up the rear. The females are placed in the centre, carrying their young firmly held in their trunks. This order they observe when they forage near the haunts of men; but when at liberty to range in extensive desert plains, they are less guarded. They often make great havock in the cultivated fields, destroying even more with the weight of their enormous feet than they consume as food. They are fond of cool sequestered places, where they may be sheltered from the mid-day sun, and love to bathe themselves with water, which they do by pouring it over their bodies with their trunks. They are said frequently to roll themselves in mud, probably like the rhinoceros, for the purpose of sheathing their skin from the attacks of insects. The elephant uses many other artifices to rid himself of these winged enemies; he strikes them with his tail, his ears, or his trunk; he contracts his skin, and crushes them between its wrinkles; he gathers boughs from the trees with his trunk, and brushes them away; and when all these

* *Beaver's African Memoranda*, p. 353.

these arts are unsuccessful, he collects dust with his trunk, and strews it over the most sensible parts of his body. He has been seen to dust himself in this manner several times a-day, especially after bathing. He swims with great ease, and in this way whole troops of them sometimes pass over rivers and narrow straits. The largest tusk elephants lead the way, and pass first. When they arrive at the opposite shore, they try whether the landing place is good, and if so, they make a signal with their trunk, and some more of the old elephants swim over, the young following with their trunks locked together, and the rest of the old ones bring up the rear.

This is nearly all we know of the manners of the elephant in the wild state. Still more interesting observations remain to be noticed respecting this animal when domesticated. We shall first give an account of the manner in which elephants are taken; and this differs according as the object is to capture single elephants, or a whole troop. Of the mode of taking elephants in Ceylon, Captain Percival has given us an interesting description in his account of Ceylon, to which we refer the reader.

The following is the method usually employed at Tiperah in the East Indies, for securing a single male elephant. As the hunters know the places whither the elephants come to feed, they advance towards them in the evening, bringing with them four *koomkees*, or female elephants trained for the purpose. In the dark nights it is easy to discover the male elephants by the noise they make in cleaning their food, by whisking it against their fore legs, and by moon light they may be distinctly seen at some distance. Having determined on the animal they wish to secure, they silently and slowly conduct three of the koomkees at a little distance from each other, near the place where the male is feeding. The females advance very cautiously, feeding as they approach, and appear like wild elephants that have strayed from the forest. When the male perceives them, he sometimes takes the alarm, and if viciously inclined, he makes a noise, and beats the ground with his trunk, shewing evident marks of displeasure, and of his unwillingness for them to come near him. If they persist, he will immediately attack and gore them with his tusks; they therefore take care to retreat in time. He generally, however, allows them to approach, and sometimes even advances to meet them.

When the drivers find him thus gentle, they conduct two of the females close to him, one on each side, and make them press gently against his neck and shoulders; the third then comes up, and is placed directly across his tail. In this situation he is so far from suspecting any design against his liberty, that he begins to toy with the females, and caresses them with his trunk. The fourth female is now brought near, and proper assistants furnished with ropes get under his belly at the tail, and fasten a slight cord round his hind legs. If he takes no notice of this, they proceed to tie his legs with a stronger cord, passed alternately from one leg to the other, so as to form a figure of 8. Six or eight such cords are usually employed, one above another, and fastened at their intersections, by another cord made to pass perpendicularly up and down. A strong cable about 60 cubits long, with a running noose, is next put round each hind leg, above the other cords, and over these six or eight more cords are crossed as before from one leg to the other, all which takes up about 20 minutes, a strict silence being observed all the time.

When thus properly secured, he is left to himself, the koomkees retiring to a little distance; in attempting to follow them, he finds his legs tied, and becoming sensible of the danger of his situation, immediately retreats towards the jungle. The drivers on the tame elephants, accompanied by a number of people who till this time had been kept out of sight, follow him at a little distance, and as soon as he passes near a tree sufficiently stout to hold him, they make a few turns of the long cables which trailed behind him round its trunk. His progress being thus stopped, he becomes furious, and exerts his utmost efforts to disengage himself. The koomkees dare not now come near him, and in his fury he falls down on the earth and tears it up with his tusks. In these exertions he sometimes breaks the cables, and escapes into the thick jungle: here the drivers dare not advance for fear of the other wild elephants, and are therefore obliged to leave him to his fate; and in this hampered situation, it is said, he is even ungenerously attacked by his former companions. But as the cables are strong, and very seldom give way, when he has exhausted himself by his exertions, the koomkees are again brought near him, and take their former positions, one on each side, and the other behind. After getting him nearer the tree, the people carry the ends of the long cables two or three times round it, so as to prevent even the possibility of his escape. His fore legs are now tied exactly in the same manner as his hind legs were, and the cables are made fast, one on each side, to trees or stakes driven deep into the earth.

When he has become more settled, and will eat a little food, with which he is supplied as soon as he is taken, the koomkees are again brought near, and a strong rope is put twice round his body, close to his fore legs, like a girth, and tied behind his shoulder; then the long end is carried back close to his rump, and there fastened, after a couple of turns more have been made round his body. Another cord is next fastened to this, and from thence carried under his tail like a crupper, and brought forward and fastened to each of the girths. A strong rope is now put round his buttocks, and made fast to each side of the crupper, so as to confine the motion of his thighs, and prevent his taking a full step. A couple of large cables, with running nooses, are put about his neck, there secured, and then tied to the ropes on each side. Thus completely hampered, the cables round his neck are made fast to two koomkees, one on each side.

Every thing being now ready, all the ropes are taken from his legs, except the strong one round his buttocks to confine the motion of his hind legs, which is still left. The koomkees pull him forward, sometimes, however, not without much struggling and violence on his part. When brought to his proper station, and made fast, he is treated with a mixture of severity and gentleness, and generally in a few months becomes tractable, and appears perfectly reconciled to his fate.

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It has happened that an elephant which escaped from captivity, suffered itself to be taken again by the hunters. This is not the only fact, as we shall see hereafter, that contradicts the observation of Horace, that no beast once escaped from slavery, suffers himself again to be entrapped (E).

The elephant when tamed, is gentle, obedient, and tractable, patient of labour, and submits to the most toilful drudgery. He is so attentive to the commands of his governor, that a word or look is sufficient to stimulate him to the greatest exertions. His attachment to his keeper is remarkable: he caresses him with his trunk, and frequently will obey no other master. He knows his voice, and can distinguish between the tones of command, of approbation, and of anger. He receives his orders with attention, and executes them with eagerness, but without precipitation. All his motions are grave, majestic, regular and cautious, and seem to correspond with the dignity of his appearance. He kneels down for the accommodation of those who would mount upon his back, and even helps them to ascend with his trunk. He suffers himself to be harnessed, and seems proud of the finery of his trappings; he will easily perform the work of several horses, being able to carry from 3000 to 4000 weight. His conductor or *cornac* is usually mounted on the neck of the elephant, and uses a rod of iron sharp at the end and hooked, with which he urges the animal forward, by pricking his head, ears, or muzzle, though this is seldom necessary, a word being usually sufficient.

In India, Mr Scot tells us, elephants are divided into two casts, viz. the koomareah and the merghee. The first consists of the large or full-bodied kind; the second of the more slender, with longer legs and thinner trunk in proportion; it is also a taller animal, but not so strong as the former. A large trunk is always considered as a great beauty in an elephant, so that the koomareah is preferred not only on this account, but for his superior strength in carrying burthens, &c. Many indistinct varieties are again produced from the intermixture of these two breeds. The torrid zone seems to be the natural clime of the elephant, and the most favourable for the production of the largest and hardiest race; and when this animal migrates beyond the tropics, the species degenerates.

The following marks are laid down by Mr Scot as descriptive of a perfect elephant. His ears should be large and rounded, not ragged nor indented at the margin: his eyes of a dark hazel colour, free from specks: the roof of his mouth and his tongue without dark or blackish spots of any considerable size: his trunk large: his tail long, with a tuft of hair reaching nearly to the ground. There must be five nails on each of his fore feet, and four on each of his hind ones; his head well set on, and carried rather high; the arch or curve of his back rising gradually from the shoulder to the middle, and thence descending to the insertion of the tail; and all his joints firm and strong.

The value of an elephant varies much, according to his cast, and as he has more or less of the above marks. The usual price at Ceylon is 50 guineas, but they sometimes fetch considerably more. History of the Species.

Elephants are kept by the princes and grandees of India, chiefly for shew and magnificence. In their travels the Indian princes are attended by hundreds of these animals. Some are employed to carry the ladies which compose the seraglio, who are placed in latticed cages covered with branches of trees; while others transport the immense quantities of baggage which the sovereigns of the east usually carry with them in their journeys. Great care is taken in the management and decoration of these elephants. They are daily fed, bathed, oiled, and rubbed, and frequently painted about the ears and head with various colours, and their tusks surrounded with rings of gold and silver. When employed in processions, they are covered with the most gaudy and sumptuous trappings.

Elephants are now seldom employed in war, as in the present state of warfare they can be of little advantage. The ancients, as is well known, used numbers of them in their armies, and we are told that Porus opposed the passage of Alexander over the Hydaspes with 85 elephants. The accounts related of those brought by Pyrrhus against the Romans, are familiar to most of our readers, and Buffon supposes that some of these were among the number that Alexander took and sent into Greece. In the later periods of the Roman republic, elephants were frequently exhibited to the people, for the cruel purpose of being put to death in conflicts with armed men. It is said that Pompey, in the space of five days, destroyed 18 elephants in this way, with a view of entertaining the populace, among whom the cries of the elephants are said to have excited much commiseration.

In the east, elephants are sometimes employed as the executioners of public justice, and they will trample a criminal to death; break his limbs with their trunk, or impale him on their enormous tusks, according to the orders given them. In some parts of India they were formerly employed in launching ships, which they effect by pushing the vessel with their heads. We are told that one of them being directed to force a large vessel into the water, and this proving too much for his strength, the master in an angry tone cried out, Take away that lazy beast, and bring another in his place. The poor animal repeated his efforts, fractured his skull, and died upon the spot.

A great many instances have been recorded of the sagacity, and almost reasoning power of this wonderful animal. We shall mention a few of these. "I was, says M. Philippe, an eye witness to the following facts.—At Goa, there are always some elephants employed in the building of ships. I one day went to the side of the river, near which a great ship was building, where there is a large area filled with beams for that purpose. Some men tie the ends of the heaviest beams with a rope, which is handed to an elephant, who carries it to his mouth, and after twisting it round his trunk,

(E) ——————Quæ bellua ruptis,
Cum semel effugit, reddit se prava catenis.

History of the Species.

trunk, draws it, without any conductor, to the place where the ship is building, though it may have been only once pointed out to him. One of these sometimes drew beams so large, that more than 20 men would have been unable to move them. But what surprised me still more, when other beams obstructed the road, he elevated the ends of his own beams that they might run easily over those which lay in his way. Could the most enlightened man do more?

He well knows when he is mocked, or otherwise ill treated. The story of the tailors of Delhi, who were drenched with puddle water by an elephant for having pricked his trunk with a needle, is well known. The following instance of retaliation is not less worthy of notice. An elephant driver at Macasa having a cocoa nut given him, he out of wantonness struck it twice against his elephant's head, to break it. The next day when the animal was passing through the street, he saw some cocoa nuts exposed to sale, and taking up one of them with his trunk, he beat it about the driver's head till he completely killed the man. This comes, says the relater, of jesting with an elephant.

When much provoked, he has been known to take the most dreadful vengeance. He is extremely fond of wine and spirits, and by shewing him a vessel of arack, he is induced to use the greatest efforts, and take the utmost pains in hopes of gaining it as the reward of his labour. An elephant disappointed of his reward in this way, out of revenge killed his cornac or governor. The poor man's wife, who beheld the dreadful scene, took her two infants, and threw them at the feet of the enraged animal, saying, "since you have slain my husband, take my life also, as well as that of my children." The elephant instantly stopped, relented, and as if stung with remorse, took the eldest boy in his trunk, placed him on his neck, adopted him for his cornac, and would never allow any other person to mount it.

The elephant is sometimes seized with periodical fits of rage, and during these he will destroy the first person he meets with; but what is very remarkable, when he has sacrificed one victim, he becomes instantly appeased, and may be then led and governed as usual.

The following instance of mutual affection between a male and female elephant, who had before been much together, and were brought to Paris in separate conveyances is very interesting.

The place for their reception had been long prepared. It was a spacious hall in the museum of natural history, well aired and lighted. A stove was placed in it to warm it during the winter; and it was divided into two apartments, which had a communication with each other by means of a large door resembling a portcullis. The inclosure round these apartments, consisted of rails made of strong thick beams, and a second inclosure, breast high, ran round them, to keep the spectators at some distance, and preserve them from accidents.

The morning after their arrival, these animals were put in possession of their new habitation. The first conducted to it was the male, who issued from his cage with precaution, and seemed to enter his apartment with a degree of suspicion. His first care was to reconnoitre the place. He examined each bar with his trunk, and tried their solidity by shaking them. Care had been taken to place on the outside the large screws by which they were held together. These he sought out, and, having found them, tried to turn them, but was not able. When he arrived at the portcullis which separates the two apartments, he observed that it was fixed only by an iron bar, which rose in a perpendicular direction. He raised it with his trunk, pushed up the door, and entered into the second apartment, where he received his breakfast. He ate quietly, and appeared to be perfectly easy.

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During this time people were endeavouring to make the female enter. We still recollect the mutual attachment of these two animals, and with what difficulty they were parted and induced to travel separately. From the time of their departure they had not seen each other, not even at Cambray, where they passed the winter. They had only been sensible that they were near neighbours. The male never lay down, but always stood upright or leaned against the bars of his cage, and kept watch for his female, who lay down and slept every night. On the least noise, or the smallest alarm, he sent forth a cry to give notice to his companion.

The joy which they expressed on seeing each other, after so long a separation, may be readily imagined. When the female entered, she sent forth a cry expressive only of the pleasure which she felt at finding herself at liberty. She did not at first observe the male, who was busy feeding in the second apartment. The latter did not immediately discover that his companion was so near him; but the keeper having called him, he turned round, and immediately the two animals rushed towards each other, and sent forth cries of joy so animated and loud, that they shook the whole hall. They breathed also through their trunks with such violence, that the blast resembled an impetuous gust of wind. The joy of the female was the most lively: She expressed it by quickly flapping her ears, which she made to move with astonishing velocity, and drew her trunk over the body of the male with the utmost tenderness. She in particular applied it to his ear, where she kept it a long time; and after having drawn it over the whole body of the male, would often move it affectionately towards her own mouth. The male did the same thing over the body of the female; but his joy was more concentrated: He seemed to express it by his tears, which fell from his eyes in abundance.

Besides the use made of the elephant, when living, he is sometimes hunted for the sake of his tusks and flesh. Mr Bruce has given us an interesting account of the mode of hunting elephants in Abyssinia, and with this we shall conclude our history of this animal.

The men who make the hunting of elephants their business, dwell constantly in the woods, and live entirely upon the flesh of the animals they kill, which is chiefly that of the elephant or rhinoceros. They are exceedingly thin, light, and agile, both on horseback and on foot. They are called *agageer*, a name derived from the word *agar*, which signifies to hamstring with a sharp weapon. More properly it means, indeed, the cutting of the tendon of the heel, and is a characteristic of the manner in which they kill the elephant, which is thus: —Two men, quite naked, to prevent their being laid hold of by the trees or bushes in making their escape from this very watchful enemy, get on horseback. One of these riders sits on the back of the horse, sometimes

Brutæ.

times with a saddle, and sometimes without one, with only a short stick in one hand, carefully managing the bridle with the other? behind him sits his companion, armed only with a broadsword. His left hand is employed in grasping the sword by the handle; about 14 inches of the blade of which are covered with whip cord. This part he takes in his right hand, without any danger of being hurt by it; and though the edges of the lower part of the sword are as sharp as a razor, he carries it without a scabbard.

"As soon as an elephant is found feeding, the horseman rides before him, as near his face as possible; or if he flies, crosses him in all directions, calling out, 'I am such a man and such a man, this is my horse, that has such a name; I killed your father in such a place, and I am now come to kill you; you are but an ass in comparison with them.' This nonsense he believes the elephant perfectly understands, who, chafed and angry at hearing the noise immediately before him, attempts to seize him with his trunk; and, intent upon this, follows the horse everywhere, turning round and round with him, neglectful of making his escape by running straight forward, in which consists his only safety. After having made him turn a few times in pursuit of the horse, the horseman rides up alongside of him, and drops his companion just behind on the off-side; and while he engages the elephant's attention upon the horse, the footman behind gives him a drawn stroke just above the heel, into what in man is called the *tendon of Achilles*. This is the critical moment; the horseman immediately wheels round, again takes his companion up behind him, and rides off after the rest of the herd, if they have started more than one; and sometimes an expert agageer will kill three out of one herd. If the sword is good, and the man not afraid, the tendon is commonly entirely separated; and if it is not cut through, is generally so far divided, that the animal, with the stress he puts upon it, breaks the remaining part asunder. In either case, he remains incapable of advancing a step, till the horseman returning, or his companions coming up, pierce him through with javelins and lances; he then falls to the ground, and expires from loss of blood.

"The elephant once slain, they cut the whole flesh off his bones into thongs, like the reins of a bridle, and hang these, like festoons, upon the branches of trees, till they become perfectly dry, without salt, and they then lay them by for their provision in the season of the rains *."

* *Bruce's Travels.*

Bosman and Labat give us terrible ideas of the courage of the elephant, and his fury when wounded; but either their accounts are much exaggerated, or the modern elephant is a much more timid animal than that of their time. Captain Beaver assures us, that when an elephant is attacked, it will endeavour to escape by any opening it can perceive; that whenever they fired at it on shore, it never turned on its enemies, but made for the openings that led into the woods. The Bijugas and Biafaras use a very long gun, loaded with a piece of an iron rod nearly equal to its caliber, for attacking the elephant, and always aim at the flank, or behind the ear, these being the most dangerous parts in which the animal can be wounded. The elephant is scarcely ever killed by a single shot †.

† *Beaver's African Memoranda*, p. 350.

For many years past a number of large bones and extraordinary teeth, have been discovered in the northern parts both of Asia and America, which at first were generally attributed to the elephant, though in Siberia they were considered as belonging to a monstrous animal called *mammoth*, whose fabulous existence they supposed to be under ground. In North America these large bones and carnivorous grinders have been found in great abundance on the Ohio and its tributary streams, washed from their banks, or discovered by digging in salt morasses in the neighbourhood of Cincinati, where they are found intermixed with the bones of buffaloes and deer, which a tradition of the Indians states to have been destroyed by a herd of these animals which came upon them from the north. This event happened, the Indians believe, as a punishment for their sins; but they say that the good spirit at length interposed to save them, and seating himself on a neighbouring rock, where they shew you the print of his seat and of one foot, hurled his thunderbolts against them. All were killed except one male, who, presenting his forehead to the shafts, shook them off, until at length wounded, he sprang over the Wabash, the Illinois, and the Great Lake, where he still lives.

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52 Mammoth.

These bones were forwarded with eagerness to all parts of Europe, and deposited in museums, where they attracted the curiosity of all naturalists, whose conjectures and theories on them were very various, until Dr Hunter, by a more accurate comparison between them and the bones of other animals, determined that they must have belonged to a large non-descript animal of the carnivorous kind, somewhat resembling the hippopotamus and the elephant, yet essentially different from both.

The subject is now completely elucidated. Not long since some farmers in the state of New York, in America, digging marl from their morasses in the neighbourhood of New Windsor, accidentally discovered several of these bones, which were preserved by physicians in the neighbourhood. In the autumn of 1801, Mr Charles Peale, and his son Mr Rembrandt Peale, having obtained possession of these bones, persevered for near three months, with much labour and expence, in searching for the remainder of this animal, and were at length so fortunate as to obtain two skeletons found in two distinct situations, and unmixed with the bones of any other individual. One of these is preserved in the museum at Philadelphia, and the other was exhibited a few years ago in London, previously to its being taken to Paris.

The length of this skeleton, from the chin to the rump, was 15 feet, and its height over the shoulders 11 feet; and from the point of the tusks to the end of the tail, in a straight line, it was 17 feet long. The whole skeleton weighed about 1000lb.

The following differences between the skull of the mammoth, and that of the elephant, are given by Mr R. Peale.

On examining the head of the elephant, it will appear, that the sockets of the tusks are situated, with respect to the condyle of the neck, nearly in an angle of 45°, so that the tusks, which have but little curve, are directed downwards and forwards, and may be with ease employed offensively and defensively. On the other hand it will be observed, that, in the mammoth, the socket is nearly in a horizontal line with the condyle;

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dyle; and therefore the tusks, which are semicircular, could never have been elevated in the air, pointing backwards, but must have had their points thrown out by the spiral twist on each side.

In the elephant, the orbit of the eye is situated where, in the mammoth, there is a large mass of bone. The cheek of the elephant is formed of two bones; but in the mammoth, besides other variations, there is but one bone. The whole figure of the under jaw differs considerably, in the length of the condyles or arms, which in the mammoth is short and angular, but in the elephant forms a semicircular line *.

* *Phil. Mag.* xiv.

Mr R. Peale seems to have no doubt that the mammoth was a carnivorous animal, feeding chiefly on shell fish; but if the animal, whose stomach was lately found in digging a well near a salt lake in Wythe county, Virginia, were really a mammoth, it is clear that this animal was at least capable of living on herbage. The contents of this stomach, which were in a state of perfect preservation, consisted of half masticated reeds, twigs, and grass or leaves †.

† *Nichol. Journ.* 8vo. vol. xiii. p. 358.

Genus 11. Sukotyro.

53 Sukotyrus. Fig. 18.

Of this genus there is only one species, of which we know little or nothing, and are not even certain that it exists: the little information that has been given of it being confined to a single traveller, Nieuhoff. He describes it as a quadruped of a very singular shape, about the size of a large ox, with a snout like that of a hog, long and rough ears, and a thick and bushy tail. He says that the eyes are placed upright in the head, and that on each side of the head, next to the eyes, stand two horns or rather tusks, not quite so large as those of the elephant, that it feeds on herbage, and is a native of Java.

Genus 12. Platypus.

54 Platypus. Fig. 19.

Mouth shaped like the bill of a duck, with two grinders on each side in each jaw; feet webbed.

There is only one species, which has been called *P. Anatinus*, or Duck-billed Platypus. It was brought from New Holland, and presented to Sir Joseph Banks. An account of it was first published by Dr Shaw in the Naturalists Miscellany, and afterwards in the General Zoology of the same author, from which the following account is taken.

"Of all the mammalia yet known, this seems the most extraordinary in its conformation, exhibiting the perfect resemblance of the beak of a duck engrafted on the head of a quadruped. So accurate is the similitude, that, at first view, it naturally excites the idea of some deceptive preparation by artificial means; the very epidermis, proportion, serratures, manner of opening, and other particulars of the beak of a shoveler, or other broad-billed species of duck, presenting themselves to the view; nor is it without the most minute and rigid examination that we can persuade ourselves of its being the real beak or snout of a quadruped.

"The body is depressed, and has some resemblance to that of an otter in miniature. It is covered with a very thick, soft, and beaver-like fur, and is of a moderately dark brown above, and of a subferruginous white beneath. The head is flattish, and rather small than large. The mouth or snout, as before observed, so exactly resembles that of some broad-billed species of duck, that it might be mistaken for such. Round the base is a flat circular membrane, somewhat deeper or wider below than above, viz. below, near the fifth of an inch, and above, about an eighth. The tail is flat, furry like the body, rather short, and obtuse, with an almost bifid termination; it is broader at the base, and gradually lessens to the tip, and is about three inches in length; its colour is similar to that of the body. The length of the whole animal, from the tip of the beak to that of the tail, is 13 inches; of the beak an inch and a half. The legs are very short, terminating in a broad web, which on the fore feet extends to a considerable distance beyond the claws; but on the hind feet reaches no farther than the roots of the claws. On the fore feet are five claws, straight, strong, and sharp-pointed; the two exterior ones somewhat shorter than the three middle ones. On the hind feet are six claws, longer and more inclining to a curved form than those on the fore feet: the exterior toe and claw are considerably shorter than the four middle ones: the interior, or sixth, is seated much higher up than the rest, and resembles a strong sharp spur. All the legs are hairy above: the fore feet are naked, both above and below. The internal edges of the under mandible (which is narrower than the upper) are serrated or channelled with numerous striæ, as in a duck's bill. The nostrils are small and round, and are situated about a quarter of an inch from the tip of the bill, and are about one-eighth of an inch distant from each other. There is no appearance of teeth: the palate is removed; but it seems to have resembled that of a duck: the tongue also is wanting in the specimen here described. The ears or auditory orifices, are placed about an inch beyond the eyes; they appear like a pair of oval holes of the eighth of an inch in diameter, there being no external ear. On the upper part of the head, on each side, a little beyond the beak, are situated two smallish oval white spots, in the lower part of each of which are imbedded the eyes, or at least the parts allotted to the animal for some kind of vision; for, from the thickness of the fur, and the smallness of the organs, they seem to have been but obscurely calculated for distinct vision, and are probably like those of moles, and some other animals of that tribe; or perhaps even subcutaneous, the whole apparent diameter of the cavity in which they are placed not exceeding the tenth of an inch.

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"When we consider the general form of this animal, and particularly its bill and webbed feet, we shall readily perceive, that it must be a resident in watery situations; that it has the habits of digging or burrowing in the banks of rivers, or under ground, and that its food consists of aquatic plants and animals. This is all that can at present be reasonably guessed at; future observations, made in its native regions, will, it is hoped, afford us ample information, and will make us fully acquainted with the natural history of an animal which differs so widely from all other quadrupeds, and which verifies in a most striking manner the observation of Buffon, viz. that whatever was possible for nature to produce, has actually been produced *.

This animal was first called *Ornithorynchus Paradoxus*, and it has been described under this name by Blumenbach of Gottingen, and by Mr Home of London. See Phil. Trans. for 1800.

* *Shaw's Zoology*, vol. i.

Mr

Brutæ

Mr Home found on dissection, that the beak of the platypus differs materially from the bill of a bird; that it was similar to that of other quadrupeds, having two grinders on each side in both jaws, but without fangs.

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55 Trichecus.

Genus 13. Trichecus. *Walrusses.*

No fore teeth in the full-grown animal in either jaw. Tusks in the upper jaw solitary; grinders with wrinkled surfaces. Lips double. Hind feet uniting at the extremity of the body into a fin.

This genus constitutes one of the links that connect the quadrupeds with the fishes; the walrusses and manati being marine animals, who, though they sometimes come on shore, pass most of their time in the water. They feed on sea weeds and shell fish, and do not appear to be carnivorous. There are about seven species, which are distinguished by the following names and characters.

1. *T. Rosmarus*, Morse or Arctic Walrus. Tusks distant and exserted.—2. *T. Dugon*, Dugon or Indian W. Tusks exserted and approximate.—3. *T. Borealis*, Whale-tailed W. Hairless, with a horizontal tail in place of hind feet.—4. *T. Australis*, Round-tailed W. Hairy, with a horizontal tail in place of feet.—5. *T. Manatis*, Guiana W. Slightly hairy, without tusks, and with a horizontal tail in place of hind feet. The following are named, but not characterized, by Dr Shaw, viz. 6. *T. Amazonius*, and, 7. *T. Hydropithecus*.

56 *Rosmarus.* Arctic Walrus Fig. 20.

1. *T. Rosmarus*, Arctic Walrus.—This is a very large animal, growing sometimes to the length of 18 feet, and so thick as to measure 12 feet about the middle of the body. Its form is clumsy and inelegant, having a small head, short neck, thick body, and short legs. The lips are very thick, and the upper lip is indented or cleft into two large rounded lobes: over the whole surface of this part are scattered numerous semitransparent bristles, of a yellowish tinge, and of such a thickness as almost to equal a straw in diameter; they are about three inches long, and are slightly pointed at their extremities. The eyes are small. Instead of external ears, there are only two small round orifices. The skin, on the whole, is thick, and more or less wrinkled, and is scattered over with short brownish hair. On each foot are five toes, all connected by webs, and on each toe is a small nail; the hind feet are considerably broader than the fore feet. The tail is extremely short. In the upper jaw are two large and long tusks bending downwards.

The arctic walrus inhabits the northern seas, and is chiefly found within the arctic circle. Great numbers are often met with in the Magdalen isles in the gulf of St Lawrence. They are gregarious, and are sometimes seen in vast multitudes on the masses of floating ice that are found in those high latitudes. They are harmless, unless when attacked or provoked, in which case they become furious, and extremely vindictive. When surprised on the ice, the females first provide for the safety of their young, by flinging them into the sea, and themselves after them. Having carried these to a secure distance, they will return to the place again with great rage to revenge any injury they have received. They will sometimes attempt to fasten their teeth on the boats, in order to sink them, or rise in great numbers under them with the intention of oversetting them, at the same time shewing all the marks of rage, by roaring in a dreadful manner, and gnashing their teeth with great violence. They are strongly attached to each other, and will make every effort in their power, even to death, to set at liberty their harpooned companions. A wounded walrus has been known to sink to the bottom, rise suddenly again, and bring up with it multitudes of others, who have united in an attack on the boat from which the insult came.

The following picture of a herd of walrusses on a mass of floating ice, is given by Captain Cook. "They lie in herds of many hundreds upon the ice, huddling over one another like swine, and roar or bray very loud, so that in the night, or in foggy weather, they gave us notice of the vicinity of the ice, before we could see it. We never found the whole herd asleep, some being always upon the watch. These, on the approach of the boat, would wake those next to them; and the alarm being thus gradually communicated, the whole herd would be awake presently. But they were seldom in a hurry to get away, till after they had been once fired at. They then would tumble over one another into the sea in the utmost confusion. And if we did not, at the first discharge, kill those we fired at, we generally lost them, though mortally wounded. They did not appear to us to be that dangerous animal which some authors have described, not even when attacked. They are rather more so in appearance than in reality. Vast numbers of them would follow and come close up to the boats. But the flash of a musket in the pan, or even the bare pointing of one at them, would send them down in an instant. The female will defend the young to the very last, and at the expence of her own life, whether in the water or upon the ice. Nor will the young one quit the dam, though she be dead; so that if one is killed, the other is certain prey. The dam, when in the water, holds the young one between her fore fins."

The tusks of this animal are used as ivory; but authors seem to differ with respect to its quality, some taking it as superior, and others far inferior to that of the elephant. The walrus is taken chiefly for the sake of its oil and its skin, from which latter is prepared a very strong and elastic leather.

This order contains nine genera, and about 30 species.

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57 Phoca.

Genus 14. Phoca. *Seals.*

Six fore teeth in the upper jaw, pointed, parallel, outer the larger; four in the lower jaw, bluntish, parallel, equal and distinct. One canine tooth on each side in both jaws, large and pointed; the upper distinct from the cutting teeth; the lower from the grinders. Five grinders on each side in the upper, and six in the lower jaw; obtusely tricuspidated. Hind feet growing together.

This constitutes another tribe of marine animals; but these are much better fitted for living on land than the walrusses, and indeed they pass much of their time either on the sea shores, on insulated rocks, or on the ice in the frozen seas, assembling in these places in vast numbers, especially at the time when the females bring

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forth their young. Here they lie basking in the sun or sporting with each other, and here they take their repose. They are found in all seas, and some of them are said to inhabit large inland lakes. They feed chiefly on fish and sea weeds.

The species are numerous, at least 19 being described by naturalists, viz.

1. * *P. Vitulina*, Common Seal. Earless, brown, with smooth head and neck.—2. *Bicolor*, Pied S. Earless, black, variegated with white, with elongated nose and lunated hind feet.—3. *P. Monachus*, Mediterranean S. Earless, with four cutting teeth in each jaw, undivided fore feet, and the hinder pinniform and without claws.—4. *P. Longicollis*, Long-necked S. Earless, long-nceked, with the fore feet pinniform.—5. *P. Falklandica*, Falkland-isle S. Cinereous, with small-pointed ears, and furrowed cutting teeth.—6. *P. Testudinea*, Tortoise-headed S. Tortoise-shaped head and slender neck.—7. *P. Fasciata*, Ribbon S. Blackish, with a squarish dorsal yellow band.—8. *P. Leporina*, Leporine S. with white, soft, subcrect fur.—9. * *P. Barbata*, Great S. Earless, blackish, with smooth head.—10. *P. Hispida*, Rough S. Pale brown, subauriculated, with smooth head, and the body covered with rising bristly hair.—11. *P. Porcina*, Porcine S. Eared, with hog-like snout and five-toed feet.—12. *P. Flavescens*, Yellow S. Yellowish, with pointed ears.—13. *P. Cristata*, Hooded S. Gray, with a folding skinny crest on the forehead.—14. *P. Groenlandica*, Harp. S. Earless, gray, with a black dorsal crescent; the horns pointing downwards along the sides.—15. *P. Pusilla*, Little S. Subauriculated, dusky, with smooth head.—16. *P. Ursina*, Ursine S. Eared, blackish, with flattish nose, and fin-like fore feet.—17. *P. Leonina*, Bottle-nosed S. Brown, male having a projecting crest or inflated membrane on the snout.—18. *P. Jubata*, Leonine S. Reddish brown, male furnished with a large mane round the neck.—19. *P. Lupina*, Urigne S. Earless, with dog-like head, and fin-like fore feet.

58 *Vitulina.* Common Seal. Fig. 21.

1. *P. Vitulina*, Common Seal, or Sea-Calf.—The usual length of this species is from five to six feet. It has a large round head, a small short neck, and several strong bristles on each side of its mouth; large eyes, no external ears, and a forked tongue. The body tapers from the shoulders to the tail. The legs are very short, and the feet all webbed. The hind legs are placed so far back as to be of but little use, except in swimming. The tail is very short. They vary in colour, being sometimes gray, sometimes brown or blackish, and now and then spotted with white and yellow. They inhabit all the European seas, and are found round all the coasts of the northern hemisphere. They are also seen in vast quantities about the southern polar regions; and Mr Pennant informs us that they even inhabit some fresh-water lakes, especially that of Baikal. Their dens or habitations are formed in hollow rocks or caverns out of the reach of the tide.

They are excellent swimmers and ready divers, and are very bold when in the sea. In the summer they will come out of the water, to bask or sleep in the sun, on the top of large stones, or shivers of rocks; and that is the opportunity our countrymen take of shooting them: if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them as they scramble along; at the same time expressing their fears by piteous moans; but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth, till they are killed. They are taken for the sake of their skins, and for the oil their fat yields; the former sell for 4s. or 4s. 6d. a piece, and, when dressed, are very useful in covering trunks, making waistcoats, shot pouches and several other conveniences. The flesh of these animals, and even of porpoises, formerly found a place at the tables of the great, as appears from the bill of fare of that vast feast that Archbishop Nevill gave in the reign of Edward IV. in which is seen, that several seals were provided on the occasion. They couple about April, on large rocks, or small islands, not remote from the shore; and bring forth in those vast caverns that are frequent on our coasts. They commonly bring forth two at a time, which, in their infant state, are covered with a whitish down, or woolly substance.

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They suckle their young for about a fortnight, in the place where they were born, and then take them out to sea, and instruct them in swimming, and seeking for their prey, which consists chiefly of sea weed. When the young are fatigued, the parents are said to carry them on their backs. The growth of the young seals is said to be so rapid, that, in about nine tides after their birth, they become as active as their parents.

Seals are very swift in their proper depth of water, dive like a shot, and in a trice rise at 50 yards distance; so that weaker fishes cannot avoid their tyranny, except in shallow water; a person of the parish of *Sennon*, saw, not long since, a seal in pursuit of a mullet (that strong and swift fish): the seal turned it to and fro in deep water, as a greyhound does a hare. The mullet at last found it had no way to escape, but by running into shoal water: the seal pursued, and the mullet, to get more securely out of danger, threw itself on its side, by which means it darted into shoaler water than it could have swam in with the depth of its haunch and fins, and so escaped.

They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs, left dry by the ebb of the tide; and if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; seldom longer than a minute: then raise their heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little, and reclining them alternately, in about a minute's time. Nature seems to have given them this precaution, as being unprovided with auricles, or external ears; and consequently not hearing very quick, nor from any great distance.

When taken young, these animals may be domesticated, will follow their master like a dog, and come to him when called by name. Some years ago a young seal was thus domesticated that had been taken at a little distance from the sea. It was usually kept in a vessel full of salt water, but was allowed to crawl about the house, and would sometimes come near the fire; its natural food was regularly brought to it, and it was every day taken to the sea, and thrown in from a boat, but would swim after the boat, and always allowed itself

Feræ. self to be taken back. It lived in this way for several weeks, and appears to have died in consequence of ill usage.

59 Canis.

Gen. 15. Canis. *Dogs.*

Six cutting teeth in each jaw; the lateral of the upper jaw longer and distant, the intermediate lobated; the lateral of the lower jaw lobated. Canine teeth solitary and curved. Grinders six or seven, or more than in the other genera of this order.

The individuals of this genus, like those of the next, have so little in common with respect to their habits and manners, and are otherwise so important in themselves, as to call for a separate account. Without making any general remarks here, we shall merely give the specific differences, and then proceed to such of the species as are most worthy of notice.

There are about 23 species; viz.

1. **Canis Familiaris*, Common Dog. Recurved tail, turned towards the left.—2. *C. Lupus*, Wolf. Tail incurvated.—3. *C. Mexicanus*, Mexican wolf. Tail deflected; body ash-coloured, and variegated with dusky bands and fulvous spots.—4. *C. Lycaon*, Black wolf. Tail straight.—5. *C. Hyæna*, Hyæna. Pale brown, striped with black, with upright mane, naked ears, straight tail, and four-toed feet.—6. *C. Crocata*, Spotted hyæna. Reddish brown, spotted with black; with straight tail, and four-toed feet.—7. *C. Aureus*, Jackall. Pale fulvous, with straight tail.—8. *C. Mesomelos*, Cape jackall. Ferruginous, with straight tail, and black dorsal band.—9. *C. Barbarus*, Barbary jackall. Pale brown with straight tail; a black descending forked band behind each ear, and three dusky bands on the tail.—10. *C. Ceilonicus*, Ceylonese dog. Yellowish gray, with lengthened snout, long sharp pointed tail, and crooked claws.—11. **C. Vulpes*, Fox. Tail straight, tipped with white.—12. *C. Alopex*, Brant fox. Tail straight, tipped with black.—13. *C. Corsac*, Corsac fox. Tail straight, fulvous, with the base and tip white.—14. *C. Karagan*, Karagan fox. Tail straight; body gray, and ears black.—15. *C. Cinereo-argenteus*, Fulvous-necked fox. Ash gray, with straight tail; and the sides of the neck fulvous.—16. *C. Virgineanus*, Virginian fox. Whitish gray, with straight tail.—17. *C. Argentatus*, Silvery fox. Deep brown, with longer hairs of a silvery white.—18. *C. Lagopus*, Arctic fox. Tail straight, feet covered with thick fur.—19. *C. Thous*, Surinam dog. Grayish, white beneath, with deflected tail.—20. *C. Bengalensis*, Bengal fox. Light brown, with a longitudinal black stripe down the face, white orbits, fulvous legs, and tail tipped with black.—21. *C. Fuliginosus*, Sooty fox. Of a sooty colour, with straight tail.—22. *C. Antarcticus*, Antarctic fox. Cinereous brown, villous; tail tipt with white.—23. *C. Zerda*, Fennec. Whitish, with straight tail, and very large upright ears, that are internally of a rose colour.

60 Domestic dog.

1. *C. Familiaris.* Domestic dog.—The varieties of the common dog are so numerous, that it is scarcely possible to give any general description of the species that would apply to all. We shall here, therefore, only give Linnæus's characteristic picture, as modified by Mr Daniel, and then enumerate the several varieties with Linnæus's characters, marking with a star those that are generally found in this country. History of the Species.

The dog eats flesh and farinaceous vegetables, but not greens (*this is a mistake, for they will eat greens when boiled*); its stomach digests bones; it uses the tops of grass as a vomit; is fond of rolling in carrion; voids its excrements on a stone; its dung (the *album græcum*) is one of the greatest encouragers of putrefaction; it laps up its drink with its tongue; makes water sideways, by lifting up one of its hind legs; is most diuretic in the company of a strange dog, and very apt to repeat it where another dog has done the same: *Odorat anum alterius; menstruans catulit cum variis; mordet illa illos; cohæret copula junctus.* Its scent is most exquisite when its nose is moist; it treads lightly on its toes, scarcely ever sweats, but when hot lolls out its tongue; generally walks frequently round the place it intends to lie down on; its sense of hearing is very quick; when asleep, it dreams. It goes with young 63 days, and commonly brings from four to ten; the male puppies resemble the dog, the female the bitch (*an assertion by no means accurate, any more than the tail always bending to the left is a common character of the species*). It is the most faithful of animals, is very docile, fawns at its master's approach; runs before him on a journey; often passes over the same ground; on coming to cross ways stops, and looks back; drives cattle home from the field; keeps herds and flocks within bounds, protects them from wild beasts; points out to the sportsman the game, brings the birds that are shot to its master; will turn a spit; at Brussels, and in Holland, draws little carts to the herb market; in more northern regions, draws sledges with provisions, travellers, &c.; will find out what is dropt; watchful by night, and when the charge of a house or garden is at such times committed to him, his boldness increases, and he sometimes becomes perfectly ferocious; when he has been guilty of a theft, slinks away with his tail between his legs; eats voraciously with oblique eyes; enemy to beggars; attacks strangers without provocation; hates strange dogs; howls at certain notes in music, and often urines on hearing them; will snap at a stone thrown at it; is sick at the approach of bad weather (*a remark vague and uncertain*); is afflicted with worms; spreads its madness; grows blind with age; *sæpe gonorrhœa infectus*; driven as unclean from the houses of the Mahometans; yet the same people establish hospitals for, and allow them daily food.

61 Varieties.

1. **Shepherd's dog*; ears erect, tail woolly underneath.

2. *Wolf-dog*; hair on the head long, ears erect, tail very much curved on the rump.

3. *Siberian dog*; ears erect, hair all long.

4. *Iceland dog*; ears erect, tips pendulous, hair long, except on the snout.

5. *Water-dog*; hair long, curled like a sheep.

6. **Little water-dog*; less; hair long, curled, round; the ears long, and hanging down.

7. *King Charles's dog*; head less, rounded; snout short, tail curved back.

8. **Spaniel*; ears long, woolly, pendulous.

9. *Maltese dog*; hair soft, silky, very long.

10. *Lion-dog*; very small; hair on the belly and tail shorter.

11. *Danish*

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11. *Danish dog;* ears small, subpendulous; snout small, acute; legs slender.

12. *Bastard pug-dog;* ears small, subpendulous; nose thick, flattish.

13. * *Pug-dog;* nose crooked upwards; ears pendulous; body square.

14. * *Bull-dog;* sides of the lips pendulous; body robust; size of a wolf.

15. * *Mastiff;* very large; sides of the lips pendulous; body robust.

16. *German hound;* ears pendulous; a spurious claw on the hind feet.

17. * *Hound;* ears pendulous; a spurious claw on the hind feet; whitish.

18. * *Bloodhound;* very sagacious.

19. * *Pointer;* tail truncate; spotted.

20. *Barbet;* tail truncate; hair long, coarse.

21. * *Greyhound;* head long; snout robust; ears small, subpendulous; legs long, stout; body long, slender.

22. *Irish greyhound;* body curved; snout narrowing; size of 15.

23. *Turkish greyhound;* body curved; snout tapering; hair a little curled; size of 25.

24. *Common greyhound;* body curved; snout tapering; size of a wolf.

25. *Rough greyhound;* body curved; snout tapering; hair longer, curled; size of a wolf.

26. *Italian greyhound;* less; body curved; snout tapering.

27. *Naked dog;* body naked.

28. *Oriental dog;* tall, slender; ears pendulous; hair on the tail very long, hanging down.

29. * *Lurcher;* body narrow; legs stout; tail strong, straight; hair short, thick set.

30. *Rough lurcher;* body narrow; legs stout; tail thick, straight; hair long, rough.

31. *Boar lurcher;* head and snout thick; body narrow behind; feet long; hair long, rough.

32. * *Turnspit;* legs short; body long, often spotted.

33. *Alco;* head small; ears pendulous; back curved; tail short; size of 9.

34. *New Holland dog;* tail bushy, pendulous; ears short, erect; snout pointed.

Of these, the *shepherd's dog*, the *Siberian dog*, the *bull dog*, the *mastiff*, the *hound*, the *bloodhound*, the *greyhound*, the *Irish greyhound*, and the *terrier*, are the most deserving of our attention. We shall make a very few remarks on each, and shall take occasion to intersperse a few anecdotes characteristic of the sagacity, cunning, strength, or courage, of this most valuable species.

62 Shepherd's Dog. Fig. 22.

The *Shepherd's dog* is supposed by many to be the original stock, whence most of the other varieties are derived. This is one of the most useful of the species, and is ever faithful to his charge. This sagacious animal is of the greatest importance in those large tracts of land which in many parts of our island are appropriated to the feeding of sheep and cattle, and where vast flocks may be seen ranging without controul, their only guides being the shepherd and his dog. This animal is strictly attentive to the commands of his master, and always prompt in the execution of them. He is the watchful guardian of the flock, keeps them together, and often drives them by himself from one pasture to another. We have heard of one of these dogs who was employed by a farmer in the south of Scotland to steal other people's sheep. His master had only to point out to him beforehand the sheep which he wished to appropriate to himself, and to send the dog at a convenient time to fetch them home. This charge he was sure to execute with the utmost punctuality and address. The proprietors of the stolen sheep were surprised at their loss, when they could not discover the person who had robbed them. The master of the dog was at length detected and hanged.

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Mr Bewick speaks of a remarkable singularity in the feet of the shepherds dogs in the northern parts of this island, viz. their having one or two toes more than other dogs, which appear to be destitute of muscles, and hang dangling behind like an unnatural excrescence. This, however, is not peculiar to the shepherd's dog, but is found in the spaniel, pointer, and hound.

63 Siberian Dog.

The *Siberian* or Greenland dog is a most useful animal to the inhabitants of the dreary regions of North America, and the north-east of Asia, especially Greenland and Kamtschatka. It bears a considerable resemblance to the shepherd's dog, but is much larger, and has more shaggy hair, and a more bushy tail. It is ferocious and savage, and rather howls than barks. It is principally employed in drawing sledges across the frozen snow; several of these animals being fastened to the sledge, which they draw with so much speed, that they have been known to perform a journey of 270 miles in less than four days.

The sledges are usually drawn by five dogs, four of them yoked two and two abreast: the foremost acting as a leader to the rest. The reins are fastened to a collar round the leading dog's neck, but are of little use in directing the pack, the driver depending chiefly upon their obedience to his voice, with which he animates them to proceed. Great care and attention are consequently used in training up those intended for leaders, which are more valuable according to their steadiness and docility; the sum of 40 rubles or 10l. being no unusual price for one of them. The rider has a crooked stick, answering the purpose both of whip and reins, with which, by striking on the snow, he regulates the speed of the dogs, or stops them at his pleasure. When they are inattentive to their duty, he often chastises them by throwing it at them. He discovers great dexterity in regaining his stick, which is the greatest difficulty attending his situation; for if he should happen to lose it, the dogs immediately discover the circumstance, and seldom fail to set off at full speed, and continue to run till their strength is exhausted, or till the carriage is overturned and dashed to pieces, or hurried down a precipice.

64 Bull-Dog.

The *Bull-dog* is the fiercest of the species, and in courage is scarcely excelled by any creature in the world. It is of a low stature, but very strong and muscular; has a short nose, and its under jaw projects forward, so as to render its aspect fierce and unpleasing. The cruel purpose for which these animals were formerly much employed, viz. bull-baiting, is now, much to the credit of the present times, going fast out of fashion, and we should hope, in the course of another century, will be entirely abolished. The uncommon ardour, and obstinacy displayed by those dogs in attacking the bull,

Feræ. bull, even under the greatest pain, are well illustrated by the following fact, related by Mr Bewick. Some years ago at a bull-baiting in the north of England, a young man, confident of the courage of his dog, laid some trifling wager, that he would, at separate times, cut off all the four feet of his dog, and that it would, after each amputation, still attack the bull. The inhuman experiment was tried; and the dog continued to seize the bull as eagerly as at first.

65 Mastiff. Fig. 23. The *Mastiff* is one of the largest and strongest dogs, and one of those for which this country is particularly famous. His principal office is that of guarding and securing houses, gardens, and other property, and for this he is admirably calculated, both from his strength and courage. The power of this dog was put to a severe trial in the reign of James I. when three of them were made to attack a lion. The result of the engagement is thus related by Stow. "One of the dogs being put into the den, was soon disabled by the lion, which took it by the head and neck, and dragged it about; another dog was then let loose, and served in the same manner; but the third being put in, immediately seized the lion by the lip, and held him for a considerable time, till being severely torn by his claws, the dog was obliged to quit his hold, and the lion, greatly exhausted in the conflict, refused to renew the engagement; but taking a sudden leap over the dogs, fled into the interior part of his den. Two of the dogs soon died of their wounds; the last survived, and was taken great care of by the king's son, who said, he that had fought with the king of beasts, should never after fight with any inferior creature.

M. D'Obsonville relates an instance of memory in a mastiff, which exceeds any thing of which even the human race seems capable. This dog, which had been brought up by him in India from a puppy, accompanied himself and a friend from Pondicherry to Benglour, a distance of above 300 leagues. The journey occupied nearly three weeks, and they had to traverse plains and mountains, to ford rivers, and go through several bye-paths. The dog, which had certainly never before been in that country, lost his master at Benglour, and immediately returned to Pondicherry. He went directly to the house of a friend of M. D'Obsonville's, with whom that gentleman had generally resided. Now the difficulty is, not so much to know how the dog subsisted on the road (for he was very strong, and able to procure himself food), but how he should so well have found his way, after an interval of more than a month.

An anecdote related by Mr Bewick shews that the mastiff possesses forbearance equal to his courage, and that he disdains to attack an inferior foe, while he knows how to chastise his impertinence. A large dog of this kind belonging to the late M. Ridley, Esq. of Heatton, near Newcastle, being frequently molested by a mongrel, and teazed by its continual barking, at last took it up in his mouth by the back, and with great composure dropped it over the quay into the river, without doing any farther injury to an enemy so much his inferior.

66 Fox-hound. Fig. 24. There are several varieties of hounds, as the fox-hound, the beagle, and the harrier. Of these the fox-hound most merits our attention.

The *Fox-hounds* of Britain are considered as superior in swiftness, strength, and activity, to those of every other country in Europe. As fox-hunting forms one of the most favourite diversions among our country gentlemen, the greatest attention is paid to the breeding, education, and maintenance of the fox hounds; and this climate seems so congenial to their nature, that they will thrive nowhere else. It is asserted that when our fox-hounds are carried over to the continent, they always degenerate. History of the Species.

The proper shape of a fox-hound is of considerable consequence, for if he is not of a perfect symmetry he will neither run fast nor bear hard work, and in a fox-chase, both great speed and strength are required. According to Mr Daniel, his legs should be as straight as arrows, his feet round and not too large; his shoulders should lie back; his breast should be rather wide than narrow; his chest deep, his back broad, his neck thin, his head moderately small, his tail thick and bushy.

Fox-hounds are sometimes employed to hunt the stag, and there is on record a remarkable instance of the stoutness displayed by these dogs in such a chase. Many years since a stag was hunted from Whinfield park, in the county of Westmoreland, until by fatigue or accident the whole pack was thrown out except two fox-hounds, bred by Lord Thanet, who continued the chase the greatest part of the day. The stag returned to the park from whence he had been driven, and at his last effort leapt the wall, and died as soon as he had accomplished it. One of the hounds ran to the wall, but being unable to get over it, lay down, and almost immediately expired: the other hound was found dead about half a mile from the park. The length of this chase is uncertain, but as they were seen at Red-kirks, near Annan, in Scotland, distant by the post-road about 46 miles, it is conjectured that the circuitous course they took, could not make the distance run, less than 120 miles.

The following anecdote is an admirable proof of the sagacity of the fox-hound. Two gentlemen had their hounds at Whinneck, Northamptonshire, and used sometimes to go to Lutterworth in Leicestershire for a fortnight's hunting. A favourite hound was left in Northamptonshire, on account of not being quite sound. The first day's hunting from Lutterworth produced an extraordinary chase, in which the hounds and horses were so tired, that it was deemed necessary to stop that night at Leicester. Upon their arrival next day at Lutterworth, they were told that a hound (which answered the description of that left in Northamptonshire), came there soon after their going out the preceding morning, and waited quietly until towards the evening; he had then shown signs of uneasiness, and in the morning had disappeared. It was concluded that, disappointed of finding his companions where he expected, the hound, whose name was *Dancer*, had returned to Whinneck; but to the surprise and concern of his masters, upon their returning home, they were informed that the hound had come back from Leicestershire, staid one day at the kennel, and then left it. Every possible inquiry was made, at length it was discovered that Dancer, upon not finding the pack either at Lutterworth or Whinneck, had proceeded into Warwickshire, to a Mr Newsome's where the hounds had been for a week some months before *.

The *Blood-hound* was held in great esteem by our ancestors,

* *Daniel's Rural Sports*, vol. I.

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ancestors, and was so remarkable for the fineness of its scent, that they employed it for recovering game that had escaped wounded from the hunters. It would also follow with considerable certainty the footsteps of a man to a great distance. In barbarous and uncivilized times, when a thief or murderer had fled, the blood-hound would trace him through the thickest and most secret coverts, and ceased not the pursuit till it had seized the felon. This is finely described by Sommerville in his poem of The Chase.

67 Blood-hound.

Mr Boyle relates a story that shews the extreme acuteness of this dog's smell, as well as his surprising sagacity. A person of quality, to make a trial whether a young blood hound was well instructed, caused one of his servants to walk to a town four miles off, and then to a market town three miles from thence. The dog, without seeing the man he was to pursue, followed him by the scent to the above-mentioned places, notwithstanding the multitude of market-people that went along the same way, and of travellers that had occasion to cross it; and when the blood-hound came to the chief market-town, he passed through the streets without taking notice of any of the people there, and left it not till he had gone to the house where the man he sought rested himself, and he found him in an upper room, to the wonder of those that followed him.

Blood-hounds are still employed in the southern part of the kingdom, either for recovering wounded deer, or for pursuing deer-stealers, whom they infallibly trace by the blood that issues from the wounds of their victims.

68 Grey-hound. Fig. 26.

The *Greyhound* is the fleetest of all dogs, and can out-run every animal of the chase; but it has not the fine scent of other hounds, it can pursue only by the eye, and must be indebted for success to its astonishing speed. The swiftness of this dog is so great, that a swift horse can do little more than keep up with him, and his ardour in pursuit of game is such as not unfrequently to occasion his death.

Greyhounds were formerly held in such repute as to be considered a most valuable present even from or to princes.

69 Irish Grey-hound. Fig. 27.

The *Irish greyhound* is supposed to be the largest of the species, as well as the most beautiful and majestic. One described by Mr Lambert, in the third volume of the Linnæan Transactions, measured above five feet from the nose to the tip of the tail, and they are said formerly to have been of a much larger size. They are found only in Ireland, and even in that country are now become extremely rare. The earl of Altamont is said to be the only person who possesses them, and his lordship has not more than eight. They were formerly employed in clearing the country of wolves, and are hence sometimes called *Irish wolf-dog*.

70 Terrier. Fig. 28.

The *Terrier* is of two kinds, one with smooth glossy hair, commonly of a black colour, or black marked with reddish spots; and the other rough and shaggy, usually of a reddish brown mixed with gray. This dog is generally an attendant on every pack of fox-hounds, being employed to force the fox from his kennel, in which he is very expert. He is also the determined enemy of rats, weazels, and other vermin, and no dog is better calculated for the useless and cruel sport of hunting the badger. He is also a good water-dog.

Mr Hope has related an anecdote respecting the terrier, which shews that this animal is both capable of resentment when injured, and of great contrivance in order to accomplish his revenge; it indeed shews that he is possessed of a certain power of combining ideas, and communicating his thoughts to other dogs. Feræ.

A gentleman of Whitmore in Staffordshire, used to come twice a-year to town, and being fond of exercise, generally performed the journey on horseback, accompanied most part of the way by a faithful little terrier dog, which, lest he might lose it in town, he always left to the care of Mrs Langford, the landlady at St Alban's; and on his return he was sure to find his little companion well taken care of. The gentleman calling one time, as usual, for his dog, Mrs Langford appeared before him with a woeful countenance:—Alas! sir, your terrier is lost! Our great house-dog and he had a quarrel, and the poor terrier was so worried and bit before we could part them, that I thought he could never have got the better of it. He, however, crawled out of the yard, and no one saw him for almost a week: he then returned, and brought with him another dog, bigger by far than ours, and they both together fell on our great dog, and bit him so unmercifully, that he has scarcely since been able to go about the yard, or to eat his meat. Your dog and his companion then disappeared, and have never since been seen at St Alban's. The gentleman heard the story with patience, and endeavoured to reconcile himself to his loss. On his arrival at Whitmore, he found his little terrier; and on inquiring into circumstances, was informed that he had been at Whitmore, and had coaxed away the great dog, who it seems had, in consequence, followed him to St Alban's, and completely avenged his injury.

71 Speaking dog.

The above anecdote, with others which we have before given, are abundantly sufficient to shew the great sagacity of the dog; but of all the qualifications that have been attributed to him, that of learning to speak must appear the most extraordinary. The French academicians, however, have given us an account of a dog in Germany which would call for tea, coffee, chocolate, &c. The account was communicated to the Royal Academy by the celebrated Leibnitz, and in substance is as follows: "This dog was of a middling size, and was the property of a peasant in Saxony. A little boy, the peasant's son, imagined that he perceived in the dog's voice an indistinct resemblance to certain words, and therefore took it into his head to teach him to speak. For this purpose he spared neither time nor pains with his pupil, who was about three years old when this his learned education commenced; and at length he made such a progress in language as to be able to articulate so many as thirty words. It appears, however, that he was somewhat of a truant, and did not very willingly exert his talents, being rather pressed into the service of literature, and it was necessary that the words should be first pronounced to him each time, which he, as it were, echoed from his preceptor. Leibnitz, however, attests that he himself heard him speak; and the French academicians add, that unless they had received the testimony of so great a man as Leibnitz, they should scarcely have dared to report the circumstance. This wonderful dog was born at Zeitz in Misnia, in Saxony*."

* *Shaw's Zoology*, vol. i. and part 2.

The flesh of the dog is eaten by some savage nations,

Feræ. and we have heard of some epicures in this country who *fatten young puppies for their table.* The skin of this animal is made into leather for gloves, &c.

For the construction and management of dog kennels, see FARRIERY, Part iv. chap. i. sect 3. For the best method of feeding hounds, see chap. ii. of the same part; and for the diseases of dogs and their treatment, especially the distemper and canine madness, see FARRIERY, Part vi.

72 Wolf. Fig. 28.

2. *C. Lupus.* The Wolf.—The wolf is much larger, stronger, and more muscular than the dog; the upper part of his face is broader, and his whole form longer; the tail too has an inward direction, and is rather long and bushy; the opening of his mouth appears a little shorter in proportion than that of the dog, but his jaws are much stronger, his teeth larger, and his eyes placed more obliquely. His general colour is a pale gray with a cast of yellow; but it varies much in shade in different parts of the world.

He is found in almost all the temperate and cold regions of the globe, even as high as the arctic circle. He was formerly very common in Britain and Ireland, insomuch that King Edgar commuted the punishment of certain crimes into the acceptance of a number of wolves tongues, and in Wales converted the tax of gold and silver into an annual tribute of 300 wolves heads. Notwithstanding these endeavours to extirpate the race of wolves, we find that in the reign of Edward I. these animals had so much increased in number, as to require a mandate from that monarch to Peter Corbet to assist in their destruction. In the county of Derby certain persons held their lands by the suit of hunting and destroying the wolves that infested the country; whence they were called *wolve-hunt.* They infested Ireland many centuries after their extinction in England; for we are told that they were found there so lately as the year 1710. In Scotland the last wolf was killed in the latter end of the 17th century, by Sir Ewen Cameron of Lochiel. In the parts of America possessed by the United States, wolves are nearly extirpated; but very lately a reward of 20 or 30 shillings was offered for killing a wolf.

Wolves prey on all kinds of animals: but in case of necessity will feed upon carrion; in hard weather assemble in vast troops, and join in dreadful howlings. Horses generally defend themselves against their attacks, but all weaker animals fall a prey to them. Throughout France the peasants are obliged nightly to house their flocks. The wolf is naturally a suspicious animal, and though so ravenous as to devour his own species when pressed by hunger, yet he is so mistrustful as to imagine every thing he sees to be a snare laid to entrap him. If he finds a rein-deer tied to a post for the purpose of being milked, he dares not approach it for fear it should be placed there only to betray him; but when once the deer is let loose, he will pursue and seize him. He is, however, so cowardly, that if the animal stands on the defensive, he will scarcely venture to attack it. They sally forth with great caution in quest of their prey; have a fine scent; hunt by nose; they are capable of bearing long abstinence; to allay their hunger will fill their bellies with mud; a mutual enmity subsists between the dogs and them: the female is in heat in winter, followed by several males, which occasions great combats; goes with young ten weeks; near her time prepares a soft bed of moss, in some retired place; brings from five to nine at a birth; the young born blind. Their bite is terrible, as their strength is great; the hunters therefore clothe their dogs, and guard their necks with spiked collars. Wolves are proscribed animals; destroyed by pitfalls, traps, or poison; a peasant in France who kills a wolf, carries its head through the villages, and collects some small reward from the inhabitants. The Khaissocks take the wolves by the help of a large sort of hawk called beskat, which is trained for the diversion, and will fasten on them and tear out their eyes *.

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These animals abound in the immense forests of Germany, where the following methods are taken to destroy them. In some very sequestered part of the forest they hang up a large piece of carrion to the branch of a tree, having previously made a train of some miles long, leaving small pieces of putrid flesh here and there to allure the wolves to the spot; they then wait till it is dark, and approach the place with great circumspection. Here they sometimes find two or three wolves assembled, leaping up, and straining themselves to catch the bait, which is placed just within their reach; while the animals are busily employed in this way, the hunters being provided with fire-arms, seldom fail to dispatch them. Again, in a convenient place, at the foot of a declivity, they make a small enclosure of strong poles, so high, that the wolf having once entered, cannot return again. An opening is left at the top of the bank; and a sheep that has been long dead, is the bait; to which he is allured by long trains, made from different places where he is known to haunt. As soon as he arrives at the spot, he examines every part of the enclosure, and finding no other way to come at the booty, he precipitates himself to the bottom; and having made a plentiful meal, endeavours in vain to re-ascend. His disappointment at not being able to get back, is productive of the most direful howlings, which alarm his enemies, and they either take him alive, or dispatch him with bludgeons. It is remarkable that when this animal finds there is no possibility of escaping, his courage entirely forsakes him; and he is for some time so stupified with fear, that he may be killed without offering to resist, or taken alive without much danger.

* *Pennant's Quadrupeds.*

Notwithstanding the savage ferocity of the wolf, more than one instance has occurred of his being tamed. Buffon brought up one which remained very quiet and docile till he was 18 or 19 months old, when he broke his fetters, and ran off, after destroying a number of fowls, and killing a dog with whom he had lived in the greatest familiarity. It is said that Sir Ashton Lever had a tame wolf, which by proper education, was entirely divested of the ferocious character of its species.

The wolf is valuable for nothing but his skin, which makes a warm and durable fur.

It is now fully ascertained that the wolf and dog will breed together, and that the breed may be continued between the mules themselves, or between them and other dogs.

It has hence been conjectured that the wolf is the original stock whence the dog is derived, but the dif-

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ferences between the two animals are so striking, that this supposition must be abandoned in favour of some other animal.

73 Hyæna. Fig. 29.

5. *C. Hyæna.* Hyæna.—This animal is about the size of a large dog, though it is sometimes found nearly six feet long from the root to the base of the tail. It is chiefly distinguished by its great strength of limbs, and a remarkable fullness of the snout, which is black; the ears are long, sharp pointed, and nearly naked, and from the neck there runs a strong bristly mane along the upper part of the back. The tail is rather short, but extremely thick and bristly with hair. All the feet have four toes. Its usual colour is a pale grayish brown, with a tawney cast, and the whole body is marked with several blackish transverse bands, running from the back downwards, those on the legs being most numerous, and of the deepest colour.

The hyæna is found in Asiatic Turkey, Syria, Persia, and in some parts of Africa, especially Barbary and Abyssinia.

It is one of the most ferocious animals of which we have any account; will prey on cattle, and frequently commits great devastation among the flocks, and prowls about in the night to feed on the remains of dead animals, or on whatever living prey it can seize. Troops of hyænas sometimes assemble, and follow the movements of an army, in order to feast on the bodies of the slain. They will even violate the repositories of the dead, and greedily devour the putrid contents of the grave. The courage of this animal is equal to its rapacity, and on occasion he will obstinately defend himself against much larger animals. He will sometimes attack the ounce and the panther, and Kæmpfer speaks of one that he saw put two lions to flight. This character, however, seems not to apply to the hyænas of Barbary; for we are told by Mr Bruce, that he has seen the Moors in the day time take this animal by the ears, and drag him along without his offering any other resistance than drawing back. The Abyssinian hyænas on the contrary, are extremely bold, and infest the towns so much in the night, that it is dangerous to stir out after dark. Mr Bruce tells us, that they were a plague in Abyssinia in every situation, both in the city and in the field, and he thinks surpassed even the sheep in number. "Gondar was full of them, from the time it became dark till the dawn of day, seeking the different pieces of slaughtered carcases, which this cruel and unclean people expose in the streets without burial, and who firmly believe that these animals are Falasha from the neighbouring mountains, transformed by magic, and come down to eat human flesh in the dark in safety. Many a time in the night, when the king had kept me late in the palace, and it was not my duty to lie there, in going across the square from the king's house, not many hundred yards distant, I have been apprehensive lest they should bite me in the leg. They grunted in great numbers about me, although I was surrounded with several armed men, who seldom passed a night without wounding or slaughtering some of them.

"One night in Maitsha, being very intent on an observation, I heard something pass behind me towards the bed; but upon looking round, could perceive nothing. Having finished what I was then about, I went out of my tent, resolving directly to return, which I immediately did, when I perceived two large blue eyes glaring at me in the dark. I called upon my servant with a light, and there was the hyæna standing near the head of the bed, with two or three large bunches of candles in his mouth. To have fired at him, I was in danger of breaking my quadrant or other furniture; and he seemed, by keeping the candles steadily in his mouth, to wish for no other prey at that time. As his mouth was full, and he had no claws to tear with, I was not afraid of him, but with a pike struck him as near the heart as I could judge. It was not till then that he shewed any sign of fierceness; but upon feeling his wound, he let drop the candles, and endeavoured to run up the shaft of the spear to arrive at me; so that, in self defence, I was obliged to draw my pistol from my girdle and shoot him; and nearly at the same time my servant cleft his skull with a battle-axe. In a word, the hyæna was the plague of our lives, the terror of our night walks, and the destruction of our mules and asses; which above all others, is his favourite food."

Feræ.

The voice of this animal is singular, beginning somewhat like the moaning of a human voice, and ending like a person making a violent effort to vomit.

Hyænas generally inhabit caverns and rocky places, where they keep themselves retired during the day.

There is said to be a remarkable particularity in this animal, viz. that when it is first dislodged from cover, and obliged to run, it always appears lame for a considerable space, sometimes to such a degree as would lead people to suppose one of his hind legs to be broken, though after running for some time this affection goes entirely off.

There is something peculiarly savage and gloomy in the aspect of the hyæna, which seems to indicate an extreme malignity of disposition, and his manners while in captivity seem to correspond with this appearance, being in general fierce and untractable. The opinion so decidedly maintained by most keepers of wild beasts, that the hyæna cannot be tamed, appears, however, to be erroneous, as there are at least two instances of the contrary on record, one by Mr Pennant, who declares that he saw a hyæna that had been rendered as tame as a dog, and the other by Buffon, who assures us, that in an exhibition of animals at Paris, in the year 1773, there was a hyæna which had been tamed very early, and was apparently divested of all its natural malevolence of disposition.

74 Jackal. Fig. 30.

7. *C. Aureus.* Jackal.—In external figure the jackal resembles the wolf more than the fox. It is also larger, and stands higher on its legs than the fox. The head is of a fox-red above, mixed with ash gray hairs, which have each a blackish ring and tip; the upper lip is white on each side of the nose, and the throat is of the same colour; the whiskers, the long hairs on the chin, and those above the eyes, which are five in number, are black; the ears are fox-red externally, and white internally; the neck and back are all over gray yellow, and both, but especially the latter, are dashed with a shade of dusky, owing to the tips of the long hairs on those parts; the under parts of the body and the legs are of a light reddish yellow, but the shoulders and thighs are externally of a fox-red; the claws are black; the thumb claw stands higher than in the dog, and is crooked; the tail is straight, somewhat longer, and

Feræ. and more hairy than in the wolf, and is of a grayish yellow, more inclining to fox-red towards the end; the long hairs have black tips, and consequently the tip of the tail appears black; the hair of the jackal is stronger and coarser than that of the wolf, and is longest on the shoulders and tail, where it measures four inches; on the neck and back it is shorter by an inch; between the hairs is situated a woolly fur of a gray colour. The four middle front teeth are of a truncated form, or if cut off, flat, not perceptibly notched or indented; the two exterior larger ones in the upper jaw are somewhat carinated, in the lower rounded; the side or canine teeth in the upper jaw are somewhat larger than in the under; the grinders are six on each side, the first being the smallest, and of a conical shape; the next grinders, to the number of two in the upper and three in the lower, are gradually larger, and divided into three points; the fourth of the upper jaw and the fifth of the under are the largest, and have two points: the remaining ones stand deeper in the jaw, or more inwards, and are smaller than the preceding; the tongue has on each side a border or row of small verrucæ or warts.

The female breeds only once a year, goes with young about four weeks, and brings forth from six to eight at a time.

Jackals go in packs of 40, 50, or even 200 at a time, and hunt like hounds in full cry, from evening to morning. They are less destructive to poultry than the wolf; they ravage the streets and villages, and gardens, and will even destroy children, if they are left unprotected. They will enter stables and out-houses, and eat any materials made of leather; they will familiarly come into a tent, and carry off whatever they can take from the sleeping traveller. For want of living prey, they will devour putrid carcases, eat the most infected carrion, and even disinter the dead, for which reason the graves in many countries are made of a great depth. Like the hyæna they will follow armies, in hopes of feasting on the slain. When they cannot get animal food, they will even feed on fruits and roots. They burrow in the earth, and lie there all the day, coming out at night to hunt. They hunt by the nose, and are very quick in scent, filling the air with the most horrid howlings when they begin the chase. The lion, panther, and other beasts of prey, take advantage of the general consternation, and follow the jackals in silence till they have hunted down their prey, when they come up and devour the fruits of the jackal's labours, leaving them only the remains of the spoil. Hence the jackal has been vulgarly termed the *lion's provider*.

There is great reason to believe that the jackal forms the primeval stock from which the domestic dog has originated. The external form, internal structure, and manners of both are very similar. According to Mr Guldenstadt, the jackal has a natural propensity to follow mankind, instead of flying from him like the wolf or the fox; the whelp of the jackal is readily tamed, and when grown up, assumes all the habits of the domestic dog; fawns on his master, expresses his joy by wagging his tail, throws himself on his back, murmurs gently, distinguishes his name, jumps on the table, &c. The jackal and dog also readily breed together, as appears from various testimonies.

11. *C. Vulpes.* Fox. The fox is found in all the temperate regions of the globe; throughout Europe, and great part of Asia; he abounds in North America, but is scarcely met with in Africa, except in Barbary. It is very common in this island. There are several varieties of the common fox; and three of these, viz. the *greyhound*, the *mastiff*, and the *cur fox*, are met with in Britain. Of these the greyhound is the largest, and is chiefly found in the mountainous parts of this island; the cur is the smallest, but the most common. History of the Species. 75 Fox.

Foxes differ very much in point of colour, according to the climate which they inhabit. In Britain they are usually of a yellowish brown colour, with white or ash-coloured marks on the forehead, shoulders, hind part of the neck, and outside of the hind legs; the lips, throat, and cheeks are white, and there is usually a white stripe running along the under side of the legs; the breast and belly whitish gray, mixed with ash colour; the tips of the ears and feet are black, and the tail is of a reddish yellow, with the tip white. In general form the fox much resembles the dog, except that his head is larger in proportion to his body, his snout more pointed, his ears shorter, and his tail more long and bushy. His eyes are prominent and piercing, of a lively hazel colour, and very expressive of the several passions by which the animal is agitated.

The smell of this animal is proverbially strong and offensive; and is said to resemble so exactly that of the root of crown imperial (*fritillaria imperialis* Lin.), as scarcely to be distinguished from it. It has however been remarked, that from a spot at the base of the tail, there proceeds an odour which has been compared to that of violets. He possesses the faculty of smelling in a degree equal to the dog, and can scent his food or his foe at the distance of some hundred yards. He has a yelping kind of bark, consisting of a quick succession of similar tones, concluding in an elevation of the voice, something like the cry of a peacock. He yelps much when in heat, and during winter, especially in frost and snow; but in summer he is almost entirely silent. In summer he casts his hair.

The fox chooses his habitation in brakes, woods, or coppices; and here he prepares his bed below hard ground, the roots of trees, or similar situations, where he can make proper outlets to escape danger. The fox's bed, in the language of hunters, is called his *kennel;* when he retires to it, he is said to *go to earth*, and when forced from it by his pursuers, he is said to be *unkenneled*. Foxes have been known to form their beds in hollow trees, that they may the better secure their young. This animal does not always take the trouble to construct a hole for himself, but often procures one by dispossessing the badger, which he does, as is said, by depositing his urine in the badger's hole, and thus obliging that cleanly animal to abandon his contaminated dwelling. He usually fixes his habitation not far from the dwellings of man, especially in the neighbourhood of farm yards. He generally keeps retired during the day, though sometimes he may be seen in clear warm weather basking in the sunshine in some dry place, and sometimes amusing himself with running round after his tail. He is so much attached to his usual abode, that it is not easy to induce him to leave

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it for another, and the same fox has been caught in the same place four successive times, having repeatedly after his escape made for his old cover*.

* *Daniel's Rural Sports*, vol. i. p. 229.

The food of the fox consists chiefly of birds, especially game and poultry, and of the lesser quadrupeds, as of young hares, rabbits, and even field mice, rats, lizards, toads, and serpents. The greyhound fox is said to attack sheep, and carry off young lambs. When pressed by hunger he will eat carrion, roots, and insects, and near the sea coast will feed on crabs, shrimps, or shell fish. He is very fond of grapes, and in France and Italy often does great mischief among the vines. He is said also to be fond of honey, for which he will attack the bee-hives, and though obliged repeatedly to make off by the fury of the enraged bees, after ridding himself of his enemies by rolling on the ground and killing them, he successively returns to the charge, and seldom fails to make himself master of the booty.

In his attack upon the neighbouring poultry, he chooses his time with judgment; and concealing his road, glides forward with caution. If he can leap the fence, or get in below it, he ravages the yard, puts all the poultry to death, and then takes measures for securing what he has killed. He retires softly with his prey, which he either hides in holes that he digs for that purpose, carefully covering it with earth, or carries it to his kennel if this be near; in a few minutes he returns for more, which he conceals in a similar manner, but in a different place, and he will thus carry off a whole flock of poultry, one by one, to his hiding places, thrusting them in with his nose, and leaving them till hunger calls for a supply. In this way he proceeds till the rising of the sun, or some noise about the farm house, gives him notice that it is time to retire.

In procuring young rabbits from their burrows, he exhibits a great degree of cunning. He does not enter the hole, for as this is very narrow, he would be obliged to dig several feet along the ground below the surface; but he follows the scent of the rabbits above, till he comes to the end where they lie, and then scratching up the earth, descends upon them and devours them.

When foxes are in heat they are said by sportsmen to go to *cliket;* this takes place in winter: the females produce but once a-year, and have from three to six young ones at a birth. While breeding, the bitch seldom lies far from the earth, and after littering, if she perceives her retreat to be discovered, she removes her cubs one by one to some more secure situation. The cubs are usually first found in the latter end of March; when brought forth, they are blind like puppies, and of a very dark brown colour; they grow for 18 months, and live about 13 or 14 years. The fox is exceedingly careful of her young, and a remarkable instance of her parental affection is recorded by Goldsmith. A she fox that had, as it should seem, but one cub, was unkenneled by a gentleman's hounds, and hotly pursued. The poor animal, braving every danger, rather than leave her cub behind to be worried by the dogs, took it up in her mouth, and ran with it in this manner for some miles; at last, passing through a farmer's yard, she was assaulted by a mastiff, and obliged to drop her cub, which was taken up by the farmer. It is pleasing to add that the affectionate creature got off in safety.

Feræ.

The fox and the dog readily breed together, and the produce is a very useful animal as a dog.

Foxes are sometimes domesticated, but are scarcely ever fully tamed.

The hunting of this animal is one of the greatest diversions of our country gentlemen. For an account of fox-hunting, see HUNTING. The skins are valuable for muffs, tippets, &c.

The arctic fox, *C. lagopus*, is well described by Steller, for whose entertaining account of their manners, we must refer to Mr Bingley's Animal Biography, vol. i.

76 *Zerda*, Fennec, Fig. 31.

23. *C. Zerda. Fennec.*—This beautiful little animal is about 10 inches long, and of a yellowish white colour; its eyes are large, and of a bright black; its ears of an uncommon size, internally of a bright rose colour, and edged with a broad margin of white hair, with an orifice so small as to be scarcely visible; its legs and feet are shaped like those of a dog; its tail long, tapering, and tipped with black.

It inhabits the vast deserts of Saara, that extend beyond Mount Atlas, and is said to be called by the Moors, *zerda*, though Mr Bruce, who saw it often, and kept two or three specimens of it, says that its proper name is *fennec*. It feeds on insects, especially locusts, sits on its rump, barks like a dog, only with a shriller voice; is very vigilant, and so swift that it is very rarely taken alive.

The following interesting account of its manners and appearance is given by Mr Bruce.

"Though his favourite food seemed to be dates, or any sweet fruit, yet I observed he was very fond of eggs; and small birds eggs were first brought him, which he devoured with great avidity; but he did not seem to know how to manage that of a hen; but when broke for him, he ate it with the same avidity as the others. When he was hungry he would eat bread, especially with honey or sugar. It was very observable that a bird, whether confined in a cage near him, or flying across the room, engrossed his whole attention. He followed it with his eyes wherever it went, nor was he, at this time, to be diverted by placing biscuit before him; and it was obvious, by the great interest he seemed to take in its motions, that he was accustomed to watch for victories over it, either for his pleasure or his food. He seemed very much alarmed at the approach of a cat, and endeavoured to hide himself, but shewed no symptom of preparing for a defence. I never heard he had any voice; he suffered himself, not without some difficulty, to be handled in the day, when he seemed rather inclined to sleep, but was exceedingly unquiet and restless so soon as night came, and always endeavouring his escape, and though he did not attempt the wire, yet with his sharp teeth he very soon mastered the wood of any common bird cage. From the snout to the anus he was about 10 inches long, his tail five and a quarter, near an inch on the tip of it was black. From the point of his fore shoulder to the point of his fore toe, was two inches and seven-eights. He was two inches and a half from his occiput to the point of his nose; the length of his ears three inches and three-eighths. These were doubled or had a plait on the bottom on the outside; the

borders

Feræ. borders of his ears on the inside were thick covered with soft white hair, but the middle part was bare, and of a pink or rose colour. They were about an inch and a half broad, and the cavities within were very large. It was very difficult to measure these; for he was very impatient at having his ears touched, and always kept them erect, unless when terrified by a cat. The pupil of the eye was large and black, surrounded by a deep blue iris. He had strong, thick mustachoes; the tip of his nose very sharp, black, and polished. His upper jaw reached beyond the lower, and had four grinders on each side of the mouth. It had six fore teeth in each jaw; those in the under jaw are smaller than the upper; the canine teeth are long, large, and exceedingly pointed; his legs are small and his feet very broad; he has four toes armed with crooked, black, sharp claws; those on his fore feet more crooked and sharp than behind. All his body is nearly of a dirty white, bordering on cream colour; the hair of his belly rather whiter, softer, and longer than the rest; and on it a number of paps, but he was so impatient it was impossible to count them. He very seldom extended or stiffened his tail, the hair of which was harder. He had a very sly and wily appearance. But as he is a solitary animal, and not gregarious, as he has no particular mark of feelings about him, no shift or particular cunning which might occasion Solomon to qualify him as wise, as he builds his nest upon trees, and not on the rock, he cannot be the Saphan (or *coney*) of the scripture, as some, both Jews and Arabians, not sufficiently attentive to the qualities attributed to that animal, have nevertheless erroneously imagined."

77 Felis.

Genus 16. Felis.

Six front teeth, of which the intermediate are equal; three grinders on each side; tongue beset with reversed prickles; claws retractile.

In this as in the last genus, the individuals would require a particular examination, though they agree more together in their form and habits than those of the dog tribe. We shall here, as in the last genus, first discriminate the species, and then give an account of some of the most remarkable individuals.

Dr Shaw distinguishes 25 species by the following names and characters.

Species 1. *Felis Leo*, Lion. Colour pale tawney, or dun; tail long, and flocky at the tip.—2. *F. Tigris*, Tiger. Tail elongated; body marked with long transverse streaks.—3. *F. Pardus*, Panther. Tail elongated; body yellow, marked with orbicular spots above, and lengthened ones below.—4. *F. Leopardus*, Leopard. Body yellow, marked with black spots, nearly contiguous, disposed in circles.—5. *F. Jubeta*, Hunting Leopard. Colour pale fulvous, with round black spots; tail of moderate length; neck slightly maned.—6. —*F. Uncia*, Ounce. Tail long; body whitish, with irregular black marks.—7. *F. Onca*, Jaguar. Tail of moderate length; body yellowish, with black ocellated roundish cornered spots, with yellow central spaces. —8. *F. Pardalis*, Ocelot. Tail longish, long stripe-shaped spots on the upper parts, and round ones on the lower.—9. *Cinerea*, Cinereous Cat.—10. *F. Puma*, Puma. Tail long; body reddish brown, whitish beneath.—11. *F. Discolor*, Black Tiger. Tail long; body black above, whitish below.—12. *F. Tigrina*, Margay. Tail long; body fulvous, striped and spotted with black, whitish beneath.—13. *F. Capensis*, Cape Cat. Fulvous, with long tail annulated with black; body marked with black stripes above, with rounded and lunated black spots on the other parts, and a lunated white bar on the ears.—14. *F. Bengalensis*.—15. *F. Manul*, Manul. Tail elongated, and annulated with black; head marked with spots, and two lateral bands of black.—16. *F. Catus*, Common Cat. Yellowish gray, with dusky bands, three on the back longitudinal; those on the sides spiral; tail barred with dusky rings.—17. *F. Japanensis*, Japan Cat.—18. *F. Guigna*, Guigna Cat.—19. *F. Corololo*, Corololo.—20. *F. Serval*, Serval. Tail shortish; body tawney brown, whitish beneath, marked with roundish dusky spots; orbits of the eyes white.—21. *F. Montana*, Mountain Lynx.—22. *F. Chaus*, Chaus. Tail moderately short, annulated towards the tip, with the tip black; body brownish yellow; ears brown, bearded with black at the tips.—23. *F. Rufa*, Bay Lynx. Tail short; body bay, obscurely spotted with black; tail white beneath and at the tip; ears bearded at the tip. —24. *F. Caracal*, Caracal. Tail shortish; body reddish-brown; ears black externally, and tipt with long black hairs.—25. *F. Lynx*, Common Lynx. Tail short; body rufous gray, slightly spotted with black, white beneath; tail black at the tip; ears terminated by long black hairs.

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78 Lion. Fig. 32.

1. *F. Leo*, The Lion.—The Lion has usually been considered as the most dignified and majestic inhabitant of the forest. His vast size and prodigious strength well entitle him to the rank of lord over most other beasts; though from the observations of modern travellers and naturalists, we are obliged to consider him in a light less formidable and less amiable than that in which he is displayed by earlier writers.

This animal seldom exceeds eight feet in length from nose to tail, and the tail itself usually measures about four feet; his head is very large; his ears rounded; his face covered with short or close hair, while the upper part of the head, the neck and shoulders, are coated with long and shaggy hair, hanging down below the breast and fore part of the belly, like a mane; the hair on the body is short and smooth; and the tail is terminated by a blackish tuft. The usual colour of the lion is a pale tawney, inclining to white on the lower part of the body.

The lioness is smaller than the lion, of a whiter colour beneath, and destitute of mane.

The lion is principally found in Africa, and is also met with, though by far less plentifully, in the hotter parts of Asia; but it is in the interior of Africa that he exerts his greatest ravages, and reigns superior among the weaker quadrupeds. His habitation is in the thickest parts of the forest, and he is seldom seen by day; but, when night approaches, he quits his retreat, and prowls about for prey. The roaring of this animal, when in quest of prey, is generally said to resemble the sound of thunder; and being re-echoed by the rocks and mountains, it appals the whole race of animals. Frequently, however, he varies his voice into a sort of a scream or yell. His strength is so great, that it is affirmed a single stroke of his paw is sufficient to break the back of a horse; and he has been seen to carry off with

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with apparent ease a middle-sized ox, or even a buffalo. We are told by Kolben, that he usually knocks down his prey with his paw, and seldom bites it till he has given the mortal blow. His teeth are so strong that he breaks the largest bones with ease, and swallows them with the flesh; and the prickles on his tongue are so large and strong, as to be capable of lacerating the skin. He usually conceals himself in a thicket, from which he darts upon his prey; and, it is said, that if he chances to miss his aim, he will not follow his prey any farther; but, as though ashamed, he turns back to the place from which he sprung on it, slowly, and step by step, as it were, measuring the distance between the two points, as if to find out how much too short, or how much beyond the mark, he had taken his leap.

Dr Sparrman says, that from all the most credible accounts he could collect concerning lions, as well as from what he himself saw, he thinks he may safely conclude, that this wild beast is frequently a great coward, or, at least, deficient in point of courage comparatively to his strength; on the other hand, however, he sometimes shews an unusual degree of intrepidity, of which he mentions the following instance as it was related to him.

A lion had broken into a walled inclosure for cattle through the latticed gate, and done considerable damage. The people belonging to the farm were assured of his coming again by the same way: in consequence of which they stretched a rope directly across the entrance, to which several loaded guns were fastened in such a manner, that they must necessarily discharge themselves into the lion's body, as soon as ever he should push against the cord, as it was expected he would, with his breast. But the lion, who came before it was dark, having probably some suspicions respecting the cord, struck it away with his foot, and without betraying the least fear, in consequence of the report made by the loaded pieces, went on steadily, and careless of every thing, and devoured the prey he had left untouched before.

The lion is said to prefer the flesh of a Hottentot to that of any other animal; and in order to procure it, will sometimes depart from his usual method of quitting his prey when he misses his aim. It is surprising with what obstinacy he will follow one of these unfortunate savages. We are informed by Mr Barrow, that one of the Namaaqua Hottentots, endeavouring to drive his master's cattle into a pool of water, inclosed between two ridges of rocks, espied a huge lion couching in the midst of the pool. Terrified at the unexpected sight of such a beast, that seemed to have its eyes fixed upon him, he instantly took to his heels. In doing this he had presence of mind enough to run through the herd, concluding that, if the lion should pursue, he would take up with the first beast that presented itself. In this, however, he was mistaken. The lion broke through the herd, making directly after the Hottentot, who, on turning round, and perceiving that the monster had singled him out, breathless and half dead with fear, scrambled up one of the tree-aloes, in the trunk of which a few steps had luckily been cut out, to come at some birds nests that the branches contained. At the same moment the lion made a spring at him, but missing his aim, fell upon the ground. In surly silence he walked round the tree, casting at times a dreadful look towards the poor Hottentot, who had crept behind the nests. We should here remark, that these nests belong to a small bird of the genus *Loxia*, that lives in a state of society with the rest of its species, constructing a whole republic of nests in one clump, and under one cover. One of these clumps of nests will sometimes extend a space of 10 feet in diameter, and contain a population of several hundred individuals. It was under the cover of one of these edifices that the Hottentot screened himself from the sight of the lion. Having remained silent and motionless for a length of time, he ventured to peep over the side of the nest, hoping that the lion had taken his departure; when to his great terror and astonishment, his eyes met those of the animal, which, as the poor fellow afterwards expressed himself, flashed fire at him. In short, the lion laid himself down at the foot of the tree, and did not remove from the place for 24 hours. At the end of this time becoming parched with thirst, he went to a spring at some distance in order to drink. The Hottentot now, with trepidation ventured to descend, and scampered off home, which was not more than a mile distant, as fast as his feet could carry him, where he arrived in safety. The perseverance of the lion was such, that it afterwards appeared, he returned to the tree, and finding the man had descended, hunted him by the scent to within 300 paces of the house *.

Feræ.

An elderly Hottentot observed a lion following him at a great distance for two hours together. He thence naturally concluded, that the lion only waited the approach of darkness, in order to make him his prey; and in the meantime expected nothing else than to serve for this fierce animal's supper, as he had no other weapon of defence than a staff. But as he was well acquainted with the nature of the lion, and the manner of its seizing upon its prey, and at the same time had leisure at intervals to ponder on the ways and means in which it was most probable that his existence would be put an end to, he at length bethought of a method of saving his life. For this end, in place of making his way home, he looked out for a *klipkrans*, or a rocky place level at top, and having a perpendicular precipice on one side of it; and sitting down on the edge of one of these precipices, he found to his great satisfaction, that the lion also made a halt, and kept the same distance as before. As soon as it grew dark, the Hottentot sliding a little forwards, let himself down below the upper edge of the precipice upon a projecting part of the rock, where he could barely keep himself from falling. But in order to deceive the lion still more, he set his hat and cloak on the stick, making with it at the same time a gentle motion just over his head, and a little way from the edge of the mountain. This crafty expedient had the desired effect. He did not remain long in that situation, before the lion came creeping softly towards him like a cat, and mistaking the skin cloak for the Hottentot himself, took his leap with such exactness and precision, as to fall headlong down the precipice, directly close to the snare which had been placed for him; when the Hottentot is said, in great joy, exultingly to have called out, *t'katsi*; an interjection which is of very extensive import and signification †.

* *Barrow's Travels in Africa*, vol. i.

Next to Hottentot's flesh he is said to prefer that of horses

† *Sparrman's Voyage.*

Feræ. horses and buffaloes, but on the sheep he seldom deigns to fix his paw, perhaps from his woolly covering, which he is too indolent to be at the labour of uncasing. It is commonly said that a lion will devour as much at once as will serve him for two or three days, and when satiated with food, he returns to his den, where he remains in a state of inactivity till hunger again compels him to seek for food.

Though this animal has generally been represented as extremely brave as well as ferocious, it has not unfrequently happened, that he has been frightened or driven away by the opposition of a much inferior enemy. It is said, that a traveller once had an opportunity of seeing a female buffalo with her calf, defended by a river at her back, keep at bay for a long time five lions which had partly surrounded her, but did not, as long as the traveller looked on, dare to attack her; and we are informed, that Mr Brew, commander of the Senegal company on the African coast, had once near him a large full-grown tame lion, about four years old, when a flock of goats passed. All the goats except one, ran off with terror at the sight of the lion; but this one looking stedfastly at the lion, stamped with his foot on the ground in a menacing manner, then retreated three steps, and instantly returning, struck the lion's forehead so violently with his horns, that the animal was stunned by the blow, and having repeated this several times before the lion could recover himself, the monstrous animal was thrown into such confusion, that he went behind his master for protection.

The lion does not always destroy the object that he attacks, but seems sometimes to spring on an animal through wantonness. Dr Sparrman was told of several who had escaped from the paw of lions. At St Catharine Cru's church, Leadenhall-street, London, provision is made, under the will of Sir John Gager, who was lord mayor in the year 1646, for a sermon to be annually preached, with a charitable donation, on the 16th of November, in commemoration of his happy deliverance from a lion, which he met in a desert as he was travelling in the Turkish dominions, and which suffered him to pass unmolested.

There seems no doubt, that in those places where mankind have made the greatest advances towards civilization, the lion has lost much of his native boldness and ferocity. Experience seems to have taught him, that in cunning and resources he is inferior to man, and he therefore seldom attacks the human race, except forced to it by the imperious calls of hunger.

The lioness is said to breed only once a-year, and to produce four or five at a birth, which she nurses with great assiduity, and attends in their first excursions for plunder. These animals readily breed in captivity.

Buffon, reasoning from the size and constitution of the lion, and the time required for his arrival at full growth, concluded, that he ought to live about 25 years; but if we may depend upon the accounts that have been given of some lions kept in the Tower of London, the period of his life may be considerably extended. One of these, called Pompey, is said to have lived at least 70 years, and another 63.

The lion has been often brought from his native forests into Europe; and, when taken young, is capable of being made very gentle and tractable. Many of our readers will have seen the keepers of wild beasts play tricks with this monstrous animal, which he appears to bear without shewing any marks of anger. He seems to bear all with the greatest composure, and we seldon hear of his revenging these unprovoked sallies of impertinent curiosity. It is, however, not always safe to play with, and still less so to mingle blows with caresses, as is done by some injudicious keepers. History of the Species.

Numerous instances are on record of the lion's gentleness, sagacity, and gratitude, while in a state of domestication. He has been known to spare the lives of animals that were thrown to be devoured by him; to live peaceably with them; to afford them part of his food, and even to want food himself, rather than deprive them of that life which his generosity had once spared. A dog was put into the cage of a lion in the menagery at the Tower, some years ago, for food; the stately animal, however, spared his life, and they lived together for a considerable time in the same den, in the most perfect harmony, and appeared to have a great affection for each other. The dog had sometimes the impudence to growl at the lion, and even dispute with him the food which was thrown to them; so true is the old proverb, *familiarity breeds contempt*: but the noble animal was never known to chastise the impertinent conduct of his little companion, but usually suffered him to eat quietly till he was satisfied, before he began his own repast.

Mr Hope relates an anecdote of a lion in the possession of the duchess of Hamilton some years ago, which affords a striking instance both of the retentive memory of this animal, and of his attachment to those who have been kind to him. "One day (says Mr Hope) I had the honour of dining with the duchess of Hamilton: after dinner the company attended her grace to see a lion, that she had in the court, fed. While we were admiring his fierceness, and teazing him with sticks to make him abandon his prey and fly at us, the porter came and informed the duchess, that a serjeant with some recruits at the gate, begged permission to see the lion. Her grace, with great condescension and good nature, asked permission of the company for the travellers to come in, as they would then have the satisfaction of seeing the animal fed. They were accordingly admitted at the moment the lion was growling over his prey. The serjeant, advancing to the cage, called out, "Nero, Nero, poor Nero, don't you know me?" The animal instantly turned his head to look at him, then rose up, left his prey, and came wagging his tail, to the side of the cage. The man then put his hands upon him, and patted him: telling us, at the same time, that it was three years since they had seen each other, but that the care of the lion on his passage from Gibraltar, had been committed to him, and he was happy to see the poor beast show so much gratitude for his attention. The lion indeed seemed perfectly pleased; he went to and fro, rubbing himself against the place where his benefactor stood, and licked the serjeant's hand as he held it out to him. The man wanted to go into the cage to him, but was prevented by the company, who were not altogether convinced of the safety of the act *." The lion is frequently hunted at the Cape of Good Hope.

* *Thoughts in Prose and Verse.*

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Hope, for the sake of his skin and flesh, which latter is esteemed by some an excellent food, and is often eaten by the negroes. The colonists of the Cape hunt him with dogs, and it is said that 12 or 16 are sufficient to overcome one lion. The lion runs for some time after being roused, then stops and shakes his mane, as if in defiance of the dogs, who, as soon as they have an opportunity, rush all at once upon him, and soon overpower him. Three or four of the dogs, however, are commonly killed in the conflict, being struck dead by the first strokes of his paw.

79 Tiger. Fig. 33.

2. *F. Tigris*, the Tiger.—This most beautiful, but most destructive of quadrupeds, is nearly equal in size to the lion, and has even been seen larger, viz. 15 feet long from the nose to the tip of the tail. The prevailing colour of the body is a deep tawney, or orange yellow; the face, throat, and lower part of the belly being nearly white, and the whole is traversed by numerous long black stripes, forming a bold and striking contrast with the ground colour. These stripes are proportionally smaller on the face and breast, than on the other parts of the body. The tail is shorter than the body, and is surrounded with black rings. Dr Shaw observes, that when seen in perfection, and before its health has been impaired by confinement, it is scarcely possible to conceive a more elegantly variegated animal than the tiger: the bright and intense orange yellow which constitutes the ground colour; the deep and well-defined stripes of black, in some parts double, in others single; the pure white of the cheeks and lower parts of the sides, over which a part of the black striping is continued, form, altogether, an appearance far superior in beauty to the skin of the zebra, or that of any other regularly marked quadruped, not excepting even the panther itself.

This animal is confined to the warmer parts of Asia, and is principally found in the peninsula of India, and the Indian islands. The species extends, however, as far as China and Chinese Tartary, to the lake Ural and the Altaic mountains.

The tiger is of a disposition so fierce and sanguinary, as to surpass in rapacity every other wild beast; indeed there is no animal that he will not venture to attack. Dreadful combats sometimes take place between him and the lion, and they are carried on with such fury and obstinacy, that both parties are often found dead together. He commits horrid ravages among the flocks and herds, and neither the sight nor opposition of man have power to make him desist. It is said that when undisturbed, he plunges his head into the body of the animal he has slaughtered, and greedily sucks its blood. His strength is astonishing. We are told that a peasant in the East Indies, had a buffalo fallen into a quagmire, and while he went to call for assistance, an immense tiger came, that immediately drew out the animal, on which the united efforts of several men had no effect. When the people returned, the first object they beheld was the tiger, with the buffalo thrown over his shoulder, as a goose is by a fox: he was carrying him away with his feet upward, towards his den. As soon however, as he saw the men, he let fall his prey, and instantly fled to the woods; but he had previously killed the buffalo, and sucked its blood. If we consider that a buffalo is often twice the size of our ordinary cattle, we may form some idea of the immense strength of an animal that could thus run off with a carcase as large again as himself.

Feræ.

The tiger's method of seizing his prey is similar to that of the lion, rushing on it at once from his concealment, with a horrid roar. His voice when springing on his victim, is said to be hideous beyond conception. Like the lion, if he misses his aim, he makes off without repeating the attack for that time.

The tiger seems to prefer the flesh of man to that of any other prey, as he takes all opportunities of seizing a man where he thinks there is any chance of success. Many of our readers will perhaps remember to have read an account of the melancholy fate of Mr Munro, who was killed by a tiger in the East Indies in the year 1792. "We went (says the narrator) on shore on Sangar island, to shoot deer, of which we saw innumerable tracks, as well as of tigers; notwithstanding which, we continued our diversion till near three o'clock, when, sitting down by the side of a jungle to refresh ourselves, a roar like thunder was heard, and an immense tiger seized on our unfortunate friend, and rushed again into the jungle, dragging him through the thickest bushes and trees, every thing giving way to his monstrous strength; a tigress accompanied his progress. The united agonies of horror, regret, and fear, rushed at once upon us. I fired on the tiger; he seemed agitated; my companion fired also; and in a few moments after this, our unfortunate friend came up to us bathed in blood. Every medical assistance was vain, and he expired in 24 hours, having received such deep wounds from the teeth and claws of the animal, as rendered his recovery hopeless. A large fire, consisting of 10 or 12 whole trees, was blazing by us at the time this accident took place, and ten or more of the natives were with us. The human mind can scarcely form an idea of this scene of horror. We had hardly pushed our boat from that accursed shore, when the tigress made her appearance, almost raging mad, and remained on the sand all the while we continued in sight."

In the beginning of the last century, as Mr Pennant was informed, some gentlemen and ladies being on a party of pleasure, under a shade of trees, on the banks of a river in Bengal, observed a tiger preparing for its fatal spring. One of the ladies, with amazing presence of mind, laid hold of an umbrella, and furled it full in the animal's face, which instantly retired, and gave the company opportunity of removing from so terrible a neighbour.

The tigress, like the lioness, produces four or five young at a litter, and though at all times furious, her rage rises to the greatest extremity in defence of her young. If robbed of them, she pursues her plunderers with the greatest fury and obstinacy, and they are often obliged to drop some of the young tigers, to prevent her from attacking them.

We are told by keepers of *wild beasts*, that the tiger when full grown, is incapable of being tamed; but it appears that when young, they are gentle, and as playful as a kitten.

The skin of this animal is much esteemed throughout the east, especially in China, where the seats of justice, on which the mandarins sit, are covered with it.

80 Panther and Leopard.

3. and 4. *F. Pardus* and *F. Leopardus*, the Panther and

Feræ. and the Leopard.—These species have frequently been confounded, and we mention them together for the sake of marking their distinguishing characters. They are usually distinguished by the form of the spots; those on the panther, having commonly a central spot in each circle, while in those of the leopard this is usually wanting. This distinction, however, by no means holds universally, and the animals are better distinguished by the general shade of colour, and by their size. The panther is of a darker colour, and larger than the leopard. After all, the distinction is by no means so strongly marked that we can always discriminate between them, and perhaps they should rather be considered as varieties of the same species. In manners and disposition they nearly resemble the tiger, yet the leopard is generally considered as less fierce than the panther. Both are found in Africa, especially about the river Senegal. It was supposed that they were to be met with in America, but this appears to be a mistake.

51 Cat. Fig. 34. 16. *F. Catus*, Common Cat.—This animal is found wild in several parts of the north of Europe, and is so formidable, that it may be called the *European tiger*. It is three or four times as large as the house cat; the head larger, and the face flatter. The teeth and claws tremendous; its muscles very strong, as being formed for rapine; the tail is of a moderate length, but very thick and flat, marked with alternate bars of black and white, the end always black; the hips and hind part of the lower joints of the leg, are always black; the fur is very soft and fine. The general colour of these animals is a yellowish white, mixed with a deep gray. These colours, though they appear at first sight confusedly blended together, yet on a close inspection will be found to be disposed like the streaks on the skin of the tiger, pointing from the back downwards, rising from a black list that runs from the head along the middle of the back to the tail.

It is the fiercest and most destructive beast we have, making dreadful havock among our poultry, lambs, and kids. It inhabits the most mountainous and woody parts of these islands, living mostly in trees, and feeding only by night. It multiplies as fast as our common cats; and often the females of the latter will quit their domestic mates, and return home pregnant by the former.

Mr Bingley informs us, that at Barnborough, a village between Doncaster and Barnsby, in Yorkshire, there is a tradition extant of a serious contest that once took place between a man and a wild cat. The inhabitants say that the fight commenced in an adjacent wood, and that it was continued from thence into the porch of the church. We do not recollect in what manner it is reported to have begun; they, however, tell us, that it ended fatally to both combatants, for each died of the wounds he received. A rude painting in the church commemorates the event; and, as in many similar traditions, the accidentally natural red tinge of some of the stones has been construed into bloody stains, which all the properties of soap and water have not been able to efface *.

They are taken either in traps, or by shooting: in the latter case it is very dangerous only to wound them; for they attack the person who injured them, and have strength enough to be no despicable enemy.

* *Bingley's Animal Biography*, vol i. p. 291.

Wild cats were formerly reckoned among the beasts of chase, as appears by a charter of Richard II. to the abbot of Peterborough, giving him leave to hunt the hare, fox, and wild cat; and in much earlier times it was also the object of the sportsman's diversion. History of the Species.

The domestic cat is so well known as to render a description of it unnecessary. It is an useful but generally a deceitful domestic; active, neat, sedate, intent on its prey. When pleased, purs and moves its tail. When angry, spits, hisses, and strikes with its foot. When walking, it draws in its claws; it drinks little; is fond of fish; its urine is corrosive; it buries its dung; it washes its face with its fore foot (Linnæus says at the approach of a storm); the female is remarkably salacious; a piteous, squalling, jarring lover. Its eyes shine in the night; its hair when rubbed in the dark emits electric sparks; it is even proverbially tenacious of life; always lights on its feet, is fond of perfumes, as *marum*, *cat-mint*, *valerian*, &c.

The cat usually lives from 6 to 10 years. A friend of ours had a cat that lived 18 years.

The female brings forth twice, and sometimes thrice, a-year. The period of her gestation is fifty-five or fifty-six days, and she generally produces 5 or 6 at one litter. She conceals her kittens from the male, lest he should devour them, as he is sometimes inclined; and, if apprehensive of being disturbed, will take them up in her mouth, and remove them one by one to a more secure retreat. Even the female herself, contrary to the established law of nature, which binds the parent to its offspring by an almost indissoluble tie, is sometimes known to eat her own young the moment she has produced them.

Instances of such conduct in the female cat are, however very rare, and few mothers exhibit more tenderness or greater attachment to their young. The assiduity with which she attends them, and the pleasure she seems to take in witnessing their playful tricks, are extremely amusing. She has also been known, not only to suckle kittens belonging to other cats, but even the young of such animals as are generally objects of prey to her kind. A very extraordinary example of this is recorded by Mr White, in his Natural History of Selborne, in a cat belonging to a friend of his.

"My friend (says Mr White) had a little helpless *leveret* brought to him, which the servants fed with milk from a spoon, and about the same time his cat kittened, and the young were dispatched and buried. The hare was soon lost, and was supposed, as with most foundlings, to have been killed by some dog or cat. However, in about a fortnight, as the master was sitting in his garden, in the dusk of the evening, he observed his cat, with tail erect, trotting towards him, and calling with little short inward notes of complacency, such as they use towards their kittens, and something gamboling after, which proved to be the leveret, that the cat had supported with her milk, and continued to support with great affection.—Thus was a granivorous animal nurtured by a carnivorous and predaceous one!

"This strange affection was probably occasioned by that desiderium, those tender maternal feelings which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from the procuring of her teats to be drawn; which were

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too much distended with milk; from habit, she became as much delighted with this foundling as if it had been her offspring.

"A boy (says this same gentleman) had taken three young squirrels in their nest. These small creatures he put under a cat who had lately lost her kittens, and finds that she nurses and suckles them with the same assiduity and affection, as if they were her own offspring.

"So many people went to see the little squirrels suckled by a cat, that the foster-mother became jealous of her charge, and in pain for their safety, and therefore hid them over the ceiling, where one died. This circumstance shewed her affection for these foundlings, and that she supposed the squirrels to be her own young."

The cat is usually stigmatized as an ungrateful animal, incapable of attachment to her master. There are, however, not wanting instances that shew this character to be unmerited. Mr Pennant, in his history of London, tells us that Henry Wriothsley earl of Southampton, the friend and companion of the earl of Essex in his fatal insurrection, having been some time confined in the Tower, was one day surprised by a visit from his favourite cat, which, says tradition, reached its master by descending the chimney of his apartment.

The following anecdote affords a striking example, both of the sagacity of this animal, and of its grateful remembrance of those with whom it had been accustomed to live. A physician of Lyons was, in July 1800, requested to inquire into a murder that had been committed on a woman of that city. In consequence of this request he went to the habitation of the deceased, where he found her extended lifeless on the floor and weltering in her blood. A large white cat was mounted on the cornice of a cupboard, at the far end of the apartment, where he seemed to have taken refuge. He sat motionless, with his eyes fixed on the corpse, and his attitude and looks expressing horror and affright. The following morning he was found in the same station and attitude; and when the room was filled with officers of justice, neither the clattering of the soldiers arms, nor the loud conversation of the company, could in the least degree divert his attention. As soon, however, as the suspected persons were brought in, his eyes glared with increased fury, his hair bristled, he darted into the middle of the apartment, where he gazed for a moment at them, and then retreated precipitately under the bed. The countenances of the assassins were disconcerted, and they were now, for the first time during the whole course of the horrid business, abandoned by their atrocious audacity.

Our ancestors seem to have had a high sense of the utility of this animal. That excellent prince Howel the Good, did not think it beneath him to include that of the cat, and to describe the qualities it ought to have. The price of a kitten before it could see, was to be a penny; till it caught a mouse, 2d.; when it commenced mouser, 4d. It was required besides, that it should be perfect in its senses of hearing and seeing, be a good mouser, have the claws whole, and be a good nurse; but if it failed in any of these qualities, the seller was to forfeit to the buyer the third part of its value. If any one stole or killed the cat that guarded the prince's granary, he was to forfeit a milch ewe, its fleece and lamb, or as much wheat as, when poured on the cat suspended by its tail, would form a heap high enough to cover the tip of the former. This is an evidence of the simplicity of ancient manners; and it almost proves to a demonstration that cats are not aborigines of these islands, or known to the earliest inhabitants. The large price set on them, and the great care taken of the improvement and breed of an animal that multiplies so fast, are almost certain proofs of their being little known at that period.

Feræ.

A beautiful variety of the cat, the *Cat of Angora*, is described in an interesting manner by M. Sonnini in his Travels in Egypt, vol. 1.

§2 Viverra.

Genus 17. VIVERRA. *WEASELS.*

Six sharp cutting teeth; canine teeth longer than the former. Tongue smooth in some species; in others furnished with reversed prickles. Body of a lengthened form.

The last circumstance mentioned in the generic character is one of the principal characteristics of this tribe, most of the species being remarkable for the length and slenderness of their form. The visage is usually sharp, the feet short, and the tail in most species long. Many of the species are notorious for a most abominable odour, with which they are capable of annoying their enemies, when attacked or disturbed. If the accounts given of this odious vapour are not aggravated by the abhorrent recollection of those who have experienced its effects, every other ill smell which nature can produce, is surpassed by the overpowering fœtor of these extraordinary quadrupeds. In consequence of this dreadful emanation, the dogs are said to relinquish the pursuit, and the men to fly with precipitation from the tainted spot; but if unfortunately the least particle of the fluid, which the animal commonly discharges at this juncture, should happen to light on the clothes of the hunter, he becomes a general nuisance wherever he appears, and is obliged to divest himself of his dress, and practise all the arts of ablution, in order to be restored to the society of mankind. They are generally harmless animals, live on rabbits, birds, and vermin, and many of them are extremely useful in destroying rats and mice, and catching rabbits. The skins of many of the species form a valuable article of the fur trade.

There are about 43 species that have been distinguished by specific characters.

1. *V. Ichneumon*, Ichneumon. Gray, with distant thumbs, and tail tapering gradually from a thick base, and tufted at the end.—2. *V. Cafra*, Caffrarian W. Yellowish brown, with tail gradually tapering from a thick base, and black at the tip.—3. *V. Zenik*, Zenik. Gray, four-toed, with 10 transverse black bands, and deep chesnut-coloured tail, black at the tip.—4. *V. Surikatta*, Surikate. Gray brown, with long moveable snout, four-toed feet, and rusty black-tipped tail.—5. *V. Nasua*, Coatimondi. Reddish, tail marked with white rings, and a lengthened moveable snout.—6. *V. Vulpecula*, Coesse. Dark chesnut, with lengthened snout.—7. *V. Striata*, Striated W. Blackish, with five parallel white stripes on the back.—8. *V. Conepati*, Conepati. Blackish, with two white lines on the back extending to the tail.—9. *V. Mephitica*, Mephitic W. or Chinche. Brown, with white back,

Feræ. back, marked with a longitudinal black stripe.—10. *V. Chinge*, Chinge. Black with a changeable cast of blue, and a row of white spots from head to tail. —11. *V. Zorilla*, Zorilla. Variegated black and white.—12. *V. Mapurito*, Mapurito. Black, with white band from the forehead to the middle of the back, and no external ears.—13. *V. Vittata*, Grison. Blackish, with a broad white band from the forehead to each shoulder. 14. *V. Quasge*, Quasge. Chesnut, yellowish beneath, with lengthened moveable snout, and ring-marked tail.—15. *V. Zeylanica*, Ceylonese W. Ash, mixed with gray, whitish beneath.—16. *V. Capensis*, Cape W. Black, with gray back, edged with white.—17. *V. Mellivora*, Honey W. Back ash, with a black lateral band; belly black; claws long.—18. *V. Civetta*, Civet. Ash-coloured, spotted with black, with chesnut-coloured mane, and dusky spotted tail. —19. *V. Zibetha*, Zibet. Ash gray, waved with black and ring-marked tail.—20. *V. Hermaphrodita*, Three-stripped W. Dark gray, with long black-tipped tail, and three black stripes on the back.—21. *V. Genetta*, Genet. Fulvous gray; body spotted with black, and ring-marked tail.—22. *V. Fossa*, Fossane. Ash-coloured, spotted with black, and ring-marked tail. —23. *V. Caudivolula*, Prehensile W. Yellow, shaded with dusky, and prehensile tail.—24. *V. Fasciata*, Fasciated W. Gray, with six longitudinal black bands.—25. *V. Malaccensis*, Malacca W. Gray, with longitudinal black stripes on the neck and rump, and round black spots on the sides. 26. *V. Tigrina*, Tigerine W. Yellowish gray, with brown variegations, ring-marked black-tipped tail, and a black stripe along the back. —27. **V. Foina*, Marten. Blackish fulvous, with white throat.—28. **V. Martes*, Pine Marten. Blackish fulvous, with yellow throat.—29. *V. Zibellina*, Sable. Blackish fulvous, with gray throat.—30. *V. Piscator*, Fisher W. Back, belly, feet, and tail black; sides brown, and face subcinereous, with black nose.—31. **V. Putorius*, Pole cat. Blackish tawney, with whitish muzzle and ears.—32. *V. Furo*, Ferret. Yellow, with red eyes.—33. **V. Vulgaris*, Common W. Pale-reddish brown, white beneath.—34. **V. Erminia*, Stoat. Tip of the tail black. —35. *V. Galera*, Galera. Entirely brown.—36. *V. Barbara*, Guiana W. Black, with a white trilobate spot below the throat.—37. *V. Quadricolor*, White-cheeked W. Yellow, cinereous, with black head, legs, and tail, bright-yellow throat, and white cheeks and chin.—38. *V. Canadensis*, Pezan. Blackish fulvous, with white pectoral spot.—39. *V. Sarmatia*, Sarmatian W. Variegated above with brown and yellow.—40. *V. Sibirica*, Siberian W. Fulvous, with extremely hairy feet.—41. *V. Touan*, Touan. Ferruginous, white beneath, with the tail naked towards the tip.—42. *Quiqui*, Quiqui. Brown, with wedge-shaped snout.—43. *V. Cuja*, Cuja. Black, with turned-up snout.—The following are enumerated by Dr Shaw, without character, viz. 44. Gray-headed W. —45. South American W.—46. Woody W.—47. Musky W. and, 48. Slender-toed W.

83 *Ichneumon.* Fig. 35. 1. *V. Ichneumon*, the Ichneumon.—Of this species there are two distinct varieties found in different countries, varying chiefly as to size, the larger being commonly about 40 inches from the nose to the tip of the tail, while the lesser scarcely exceeds two-thirds of that length, The greater variety has also the tail slightly tufted at the end. In other respects they bear a near resemblance to each other. They are commonly of a pale reddish gray colour, each hair being mottled with brown, so as to make the whole body appear speckled. The eyes are of a bright red or flame colour; the ears rounded and almost naked; the nose long and slender, and the body rather thicker than in the other species of this genus. The tail is very thick at the base, and the hair on the whole animal is hard and coarse. History of the Species.

The larger ichneumon is found chiefly in Egypt, and in some other parts of Africa; the smaller seems confined to the East Indies. In their wild state these animals frequent the banks of rivers, and, during floods, approach the highest grounds and inhabited places in quest of prey. They are said to swim and dive occasionally, and are able to continue under water for a considerable time. The voice of the ichneumon is very soft, resembling a murmur; but it is said never to exert it unless struck or irritated. When going to sleep, it rolls itself up like a ball, and is not easily awakened.

Both varieties, but especially the Egyptian, are great enemies to serpents, rats, and other noxious animals; and the Indian variety attacks with great eagerness that dreadful snake, the *cobra-di-capello*. Hence they are held in great esteem both by the Egyptians and the natives of India, and are kept like our dogs and cats as domestic animals. It is easily tamed, is very active, and springs with great agility on its prey. It will glide along the ground like a serpent, and seem as if without feet. It sits up like a squirrel, and eats with its fore feet; catches any thing that is flung to it. It is a great enemy to poultry, and will feign itself dead till they come within its reach. It is said to be extremely skilful in seizing the serpents by the throat, in such a manner as to avoid receiving any injury. Lucan has beautifully described the same address of this animal in conquering the Egyptian asp.

M. d'Obsonville had an ichneumon very young, which he brought up; he fed it at first with milk, and afterwards with baked meat mixed with rice. It soon became tamer even than a cat; for it came when called, and followed him, though at liberty, into the country. One day he brought to the animal a small water serpent alive, being desirous to know how far his instinct would carry him against a being with which he had been hitherto unacquainted. His first emotion seemed to be astonishment mixed with anger, for his hair became erect; but an instant after, he slipped behind the reptile, and with a remarkable swiftness and agility leaped upon its head, seized it, and crushed it between his teeth. This essay, and new aliment, seemed to have awakened in him his innate and destructive voracity, which till then had given way to the gentleness he had acquired from his education. M. d'Obsonville had about the house several curious kinds of fowls, among which the ichneumon had been brought up, and which before the above adventure he had suffered to go and come unmolested and unregarded; but in a few days after, when he found himself alone, he strangled every one of them, ate a little, and, as appeared, had drunk the blood of two.

The ichneumon is said to be short-lived, but grows very rapidly. They have been brought into our cli-

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mates; but cannot, without great difficulty, be either reared or preserved. They appear much incommoded by frosty weather, and soon fall victims to the change of climate.

84 Civet. Fig. 36.

18. *V. Civetta*, Civet, or Civet Cat.—This animal is about two feet long from nose to tail, and the tail measures about 14 inches. The ground colour of the body is a yellowish gray, marked with large blackish or dusky spots, disposed in longitudinal rows on each side, and sometimes intermixed with a tinge of rusty colour. The hair is coarse, and stands up along the top of the back like a sort of mane; the ears are short and rounded; the eyes of a bright sky blue; the tip of the nose, sides of the face, chin, breast, lips, and feet, are black; the remainder of the face and part of the sides of the neck of a yellowish white; and from each ear there are three black stripes terminating at the throat and shoulders. The tail is generally black, but is sometimes marked with pale spots near its base. At a little distance below the tail there is a large, double, glandular receptacle, which contains the secretion called *civet*, employed as a perfume. See CIVET.

This animal is found in several parts of Africa and India. It is of a wild disposition, living, like most of its kind, on birds and the smaller quadrupeds. It is said to be very voracious, and will sometimes roll itself for some time on its food before it eats it. It is very destructive to poultry, which it seizes whenever it can steal into a farm yard. It is very prolific, active, and nimble, jumping like a cat, and running very nimbly. Its voice is stronger than that of a cat, and somewhat resembles the cry of an enraged dog. It is capable of being tamed, and is usually kept by perfumers at Amsterdam and some other places for the sake of the *civet*.

These animals, in a state of confinement, are placed, from time to time, in strong wooden cages or receptacles, so constructed as to prevent the creature from turning round, and biting the person employed in collecting the *civet*: this operation is said to be performed twice a week, and is done by scraping out the civet with a small spoon. The quantity usually collected at each time amounts to about a dram.

85 *Foina*, Marten. Fig. 37.

27. *V. Foina*, the Marten.—This is an animal of a very elegant appearance. It is about 18 inches long from nose to tail, and its tail is about 10 inches. It is of a blackish tawney colour, with a white throat, and a dusky brown belly. The tail is bushy, and darker than the rest of the body; the ears are pretty large and rounded, and the eyes are very lively.

It is found in most parts of Europe, and is not uncommon in Britain. It inhabits woods and fields, and preys on birds and other small animals. It breeds in the hollows of trees, and brings forth from three to five young at a birth.

The marten attacks pheasants when at roost, and makes great havock among them. For this reason game-keepers are careful to set traps for them, which are baited with a piece of pheasant or wood-pigeon. Mr Daniel recommends the following mode of catching them, in parks or places that are paled in. As they constantly run to the pales and posts to dry themselves in the morning, have a groove cut in some of the posts or gate-posts where they run, sufficient to contain a strong hawk or rat trap; the trap must be set in this groove without a bait; in leaping upon the place they are sure to be taken; a small chain should be fixed to the trap and fastened to the post. The skin of the marten affords a valuable fur.

Feræ.

86 *Zibellina*, Sable.

29. *V. Zibellina*, the Sable.—This animal is very similar in its general appearance to the marten, but its fur is finer, and of a deep glossy brown; the hair being ash-coloured at the root, and black at the tips. The tail is also much shorter than in the marten.

It inhabits the northern parts of Asia, where it lives in holes under ground, especially below the roots of trees. In manners and disposition it greatly resembles the marten.

The skins of sables form one of the most valuable articles of the fur trade; and for these the animals are hunted with great eagerness.

The hunting is usually carried on by criminals confined to the desert regions of Siberia, or by soldiers sent thither for that purpose, who generally remain there for several years. Both are obliged to furnish a certain quantity of furs. They shoot with a single ball, to injure the skin as little as possible. They frequently take them in traps, or kill them with blunt arrows. As an encouragement to the hunters, they are allowed to share among themselves whatever skins they take above the allotted number; and this, in a few years, amounts to a considerable premium.—The hunters form themselves into small troops, each of which is directed by a leader of their own choosing.

The season of hunting is from November to February; for at that time the sables are in the highest perfection. Those caught at any other time of the year are full of short hairs, and are sold at inferior prices. The best skins are such as have only long hair, which is always black, and of a glossy brightness. Old furs do not retain their gloss.—Both the Russians and Chinese have a method of dyeing their furs; but the dyed sables are easily discovered, having neither the smoothness nor the brightness of the natural hair.

87 *Putorius*, Polecat, or Foumart.

31. *V. Putorius*, the Polecat, Fitchet, or Foumart.—The length of this animal is about 17 inches, exclusive of the tail; that of the tail six. Its shape is long and slender; the nose sharp-pointed, and the legs short: in fine, admirably formed for insinuating itself into the smallest holes and passages, in search of prey. It is very nimble and active, runs very fast, will creep up the sides of walls with great agility, and spring with vast force. In running, the belly seems to touch the ground; in preparing to jump, it arches its back, which assists it greatly in that action. The ears are short, rounded, and tipt with white; the circumference of the mouth is wholly of a chocolate colour, almost black. The sides are covered with hairs of two colours, the ends of which are of a blackish hue, like the other parts; the middle of a full tawney colour.

The toes are long, and separated to the very origin; the tail is covered with pretty long hair.

The polecat is very destructive to young game of all kinds, and to poultry: it generally resides in woods, or thick brakes, burrowing under ground, forming a shallow retreat, about two yards in length, which commonly ends for its security, among the roots of some large trees. It will sometimes lodge under hay ricks, and

Feræ. and in barns; in the winter it frequents houses, and makes a common practice of robbing the dairy of the milk. It also makes great havock in warrens.

Though the smell of the polecat, when alive, is rank and disagreeable, even to a proverb, yet the skin is dressed with the hair on, and used as other furs for tippets, &c. and is also sent abroad to line clothes.

Mr Bewick mentions an extraordinary method which this animal sometimes practises to procure itself subsistence. During a severe storm, one of these animals was traced in the snow from the side of a rivulet to its hole, at some distance from it. As it was observed to have made frequent trips, and as other marks were to be seen in the snow which could not be easily accounted for, it was thought a matter worthy of greater attention. Its hole was accordingly examined, the foumart taken, and 11 fine eels were discovered to be the fruits of its nocturnal excursions. The marks in the snow were found to have been made by the motion of the eels in the creature's mouth.

88 *Furo.* Ferret. Fig. 38.

32. *V. Furo*, the Ferret.—This animal is about 14 inches long, and its tail about five. Its nose is sharper than that of the polecat; its ears are round, eyes red and fiery, and the colour of its whole body a very pale yellow. It breeds twice in the year, unless it devours its offspring, as it sometimes does as soon as brought forth; it then has three litters. The ferret goes with young six weeks and has generally six or seven young, which are blind for a month.

It is a native of Africa, and was originally brought into Spain, to free that country from the multitudes of rabbits with which it was overrun.

After two months the young are fit for service in catching rabbits; they should be kept in tubs, or small boxes, where they can be supplied with plenty of clean straw, as they are offensive and smell strong; before you use, do not feed them, for with their bellies full they will not hunt, but sleep in the burrows for hours. The ferret is the natural enemy to the rabbit, insomuch, that if a dead rabbit be laid before a ferret, it instantly seizes upon it, although it has never seen one before; if shewn a living rabbit, the ferret is still more eager, fastens on the neck, winds itself round and sucks the blood until satiated. The ferret, however, is apt to lose its savage nature, unless the breed is crossed with the polecat, which the warreners frequently do, and the produce is of a much darker colour, partaking of that of the fire.

89 *Vulgaris.* Weasel

33. *V. Vulgaris*, Common Weasel.—This is one of the smallest of the tribe; its general length being about seven inches, with a tail little more than two inches long. It is usually of a reddish brown on the back, sides, and legs, white on the throat and belly, and below the corners of the mouth on each jaw is a spot of brown. The ears are small and rounded; the mouth furnished with whiskers, and the eyes are black.

The female brings forth in the spring, and produces four or five at a birth. Of these she is very careful, and, as we are told by Aldrovandus, will carry them about from place to place, when she suspects that they will be stolen from her.

The food of this animal is similar to that of the other species, and it is very destructive to young birds, poultry, and rabbits. Its favourite food seems to be the field mouse. It is also very fond of eggs. It is exceedingly active, and will run up the sides of walls with such facility, that scarcely any place is secure from it; and its body is so small, that there are few holes through which it cannot creep. History of the Species.

It is found in most of the temperate parts of Europe, is very common in this island, and is also occasionally met with in Barbary. It inhabits the cavities below the roots of trees, and the banks of rivulets, from which it sallies out in quest of its prey.

The weasel was supposed by Buffon to be untameable; but it appears from a communication made to him by a lady, and published in his 7th supplemental volume, that it may be rendered very gentle and domestic. The account is very amusing, but we have not room for it here. It is given by Dr Shaw, vol. i. p. 521. and Mr Bingley, vol. i. p. 314.

Genus 18. Lutra. *Otters.*

90 Lutra.

Teeth as in the former genus. Feet webbed.

Linnæus formed two genera of the animals which are usually called weasels, viz. *viverra* and *mustela*, in the latter of which he comprised the otters. Mr Pennant and Dr Shaw have united the mustelæ to the viverræ, and have made a new genus of the otters, to which Dr Shaw gives the name of *lutra*.

There are eight species, viz.

1, **L. Vulgaris*, Common O. Brown, with naked feet, and tail half as long as the body.—2. *L. Lutreola*, Smaller O. Blackish tawney, with hairy feet, equal toes, and white muzzle.—3. *L. Marina*, Sea O. Black, with hairy feet, and very short tail.—4. *L. Brasiliana*, Brazilian O. Black, with yellow throat.—5. *L. Saricovienna*, Saricovienne O. Gray, spotted with black.—6. *L. Gracilis*, Slender O. Brown, with extremely slender body.—7. *L. Vison*, Vison O. Body entirely of a deep chesnut colour.—7. *L. Felina*, Chinchemin O. Of the shape and appearance of a cat.

91 *Vulgaris.* Common Otter. Fig. 39.

1. *L. Vulgaris*, Common O. The usual length of this animal is about two feet from nose to tail, and the tail is about 16 inches long. The head and nose are broad and flat; the eyes are small, but very brilliant, and are placed nearer to each other than in most quadrupeds, which gives the otter a singular appearance, not unlike an eel. The ears are extremely short; the opening of the mouth small; the lips very muscular, capable of being brought very close together; and the nose and corners of the mouth are furnished with long whiskers. The legs are remarkably short, but very muscular; and the joints are articulated so loosely, that the animal can bring its legs on a line with its body, and use them as fins for swimming. Its fur is of a deep brown colour.

Otters are found in most parts of Europe, and are met with occasionally in Britain. They inhabit the banks of rivers, and their principal food consists of fish, though they will sometimes attack poultry and the smaller quadrupeds. They are said to be as destructive in a fishpond as a polecat is in a henhouse.

The otter makes its nest in some retired spot, where it can have an easy and secure access to the water, to which it immediately flies on the least alarm; and as it is very active, and swims with great rapidity, it is not easily taken. This animal is very nice, and will eat no fish but such as are perfectly fresh. As soon as he catches

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catches a fish, he drags it on shore, and devours it as far as the vent; but unless extremely pressed with hunger, he always leaves the rest. It swims against the stream in rivers, and may sometimes be seen in concert with a companion hunting the salmon. It has been supposed that the otter never goes out to sea, but this appears to be a mistake, for they have been seen about the Orkneys, hunting sea fish, especially cod.

When taken young, the otter is easily tamed, and may be made to catch fish for its master's use. The usual way of teaching them is, first to make them fetch and carry like a dog; they have then given them a truss stuffed with wool, in the shape of a fish, which they are accustomed to take in their mouths, and drop at command. From this they proceed to real fish, which are thrown dead into the water, whence they are taught to fetch it; and thus by degrees they are made to catch living fish. Mr Bewick informs us that a man near Wooler had a tame otter, which followed him wherever he went. He frequently carried it to fish in the river, and, when satiated, it never failed returning to its master. One day, in the absence of his master, being taken out by his son to fish, instead of returning as usual, it refused to come at the accustomed call, and was lost. The father tried every means to recover it; and after several days search, being near the place where his son had lost it, and calling it by its name, to his inexpressible joy it came creeping to his feet, and shewed many marks of affection and firm attachment. Its food, exclusive of fish, consisted chiefly of milk and hasty pudding.

Some years ago, one James Campbell, near Inverness, had a young otter, which he brought up and tamed. It would follow him wherever he chose, and if called on by its name, would immediately obey. When apprehensive of danger from dogs, it sought the protection of its master, and would endeavour to fly into his arms for greater security. It was frequently employed in catching fish, and would sometimes take eight or ten salmons in a day. If not prevented, it always made an attempt to break the fish behind the fin next to the tail; and as soon as one was taken away, it immediately dived in pursuit of more. When tired, it would refuse to fish any longer, and was then rewarded with as much fish as it could devour. Being satisfied with eating, it always curled itself round, and fell asleep, in which state it was carried home. The same otter fished as well in the sea as in the river, and took great numbers of codlings and other fish. Its food was generally fresh fish, and sometimes milk. What is still more extraordiuary, the otter has been made to hunt fish along with dogs, who never gave him the smallest molestation, though accustomed to hunt other otters.

The flesh of the otter is rank and disagreeable, and partakes so much of the nature of fish, that by the Roman Catholic religion it is allowed to be eaten on fast days; and Mr Pennant tells us, that he saw in the kitchen of the Carthusian convent, near Dijon, an otter preparing for the dinner of that religious order, who by their rules are prohibited during their whole lives the eating of flesh.

The sea otter is chiefly valuable on account of its fur, which is thick and long, generally of a shining black colour, but sometimes of a silvery hue. It is hunted for its fur in Kamtschatka, and the opposite coasts of America.

Feræ.

Genus 19. Ursus. *Bears.*

92 Ursus.

Six front teeth in both jaws; the two lateral of the lower jaw longer than the rest, and lobed, with smaller or secondary teeth at their inner bases. Canine teeth solitary. Grinders five or six on each side, the first very near the canine teeth. Tongue smooth. Snout prominent. Eyes furnished with a nictitating membrane.

The individuals of this species have not many circumstances in common, except those mentioned in the generic character. The soles of their feet are long, and extend to the heel, from which circumstance they tread very firmly. Their claws are long and sharp, and they are thus enabled to climb trees with great dexterity, either in search of prey, or to escape from their enemies. Some of the species use their fore paws as hands.

There are about nine species, which are thus distinguished.

1. *U. Arctos*, Brown Bear. Blackish brown, with abrupt tail.—2. *U. Americanus*, American B. Black, with rusty cheeks and throat.—3. *U. Maritimus*, White or Polar Bear. White, with elongated neck and head, and abrupt tail.—4. *U. Gulo*, Glutton. Reddish brown, with tail of the same colour, and the middle of the back black.—5. *U. Luscus*, Wolverine. Rusty, with dusky snout, and forehead and lateral band of the body whitish.—6. *U. Lotor*, Racoon. Tail ring-marked, and a black band across the eyes.—7. *U. Meles*, Badger. Tail unmarked; body gray above, black below, and a longitudinal black band through the eyes and head.—8. *U. Labradorius*, American Badger. Pale yellowish gray, with the throat and belly white, and head striped with black.—9. *U. Indicus*, Indian Badger. White above, black beneath.

93 *Arctos*, Common Bear. Fig. 40.

1. *Ursus Arctos*, Common or Brown Bear.—There is a considerable variety of colour in different individuals of this species, according to the climate it inhabits. The prevailing colour is a blackish brown, but they are sometimes seen gray, or even quite white. His general appearance is very clumsy; his body thick, legs very strong, head round, neck short, and he is covered with a very long thick fur.

He is a native of almost all the northern parts of Europe and Asia, and is said to be found in some of the Indian islands, especially Ceylon. He inhabits woods and unfrequented forests, where he passes the greatest part of winter in a state of repose and abstinence, coming out only at distant intervals, and again concealing himself till the approach of spring. He lives chiefly on vegetables, such as roots and fruits; but when pressed by hunger, he becomes fierce and ravenous, and will attack animals of almost every description. He is said to be particularly fond of honey, in search of which he climbs trees, in order to get at the nests of wild bees. He will catch and devour fish, and occasionally frequents the banks of rivers for that purpose. It is observed that the brown and black varieties differ somewhat in their choice of food, the former living almost entirely on vegetables, while the latter frequently attack cattle, lambs, and kids, the blood of which they suck, like many of the cat and weasel tribe.

The

Feræ.

The females bring forth two young at a birth. It was formerly supposed that these cubs were nearly shapeless masses, that were gradually licked and fashioned into shape by the parent, whence the expression of an *unlicked cub*, for an awkward ill-manner'd booby. This has long been proved to be a vulgar error. Though not shapeless, the cubs are, however, usually blind for about a month. The bear is an animal that is extremely useful to the inhabitants of the north of Europe; his flesh is nearly as good as pork, and makes excellent bacon. His skin is used for muffs, tippets, and other articles of dress, and the fat is held in great estimation by the inhabitants of Kamtschatka as a very savoury and wholesome nourishment.

When tamed, it appears mild and obedient to its master, but is not to be trusted without the utmost caution.—It may be taught to walk upright, to dance, to lay hold of a pole with its paws, and perform various tricks to entertain the multitude, who are highly pleased to see the awkward measures of this rugged creature, which it seems to suit to the sound of an instrument, or to the voice of its leader. But to give the bear this kind of education, it must be taken when young, and early accustomed to restraint and discipline. An old bear will suffer neither, without discovering the most furious resentment; neither the voice nor menace of his keeper has any effect upon him; he equally growls at the hand that is held out to feed, as at that which is raised to correct him.

The excessive cruelties practised upon this poor animal, in teaching it to walk erect, and regulate its motions to the sound of the flageolet, are such as make sensibility shudder. Its eyes are put out, and an iron ring being put through the cartilage of the nose, to lead it by, it is kept from food, and beaten, till it yield obedience to the will of its savage leaders. Some of them are taught to perform by setting their feet upon hot iron plates, and then playing to them whilst in this uneasy situation. It is truly shocking to every feeling mind, to reflect that such cruelties should be exercised upon any part of the brute creation by our fellow men. That they should be rewarded by numbers of unthinking people, who crowd around them to see the animal's rude attempts to imitate human actions, is not to be wondered at; but it is much to be wished, that the timely interference of the magistrate would prevent every exhibition of this kind, that, in Britain at least, we might not be reproached with tolerating practices so disgraceful to humanity.

One of these animals, presented to the prince of Wales a few years ago, was kept in the Tower. By the carelessness of the servant, the door of his den was left open, and the keeper's wife happening to go across the court at the same time, the animal flew out, seized the woman, threw her down, and fastened upon her neck, which he bit, and without offering any farther violence, lay upon her, sucking the blood out of the wound. Resistance was in vain, as it only served to irritate the brute, and she must inevitably have perished, had not her husband luckily discovered her situation. By a sudden blow he obliged the bear to quit his hold, and retire to his den, which he did with great reluctance, and not without making a second attempt to come at the woman, who was almost dead through fear and loss of blood. It is somewhat remarkable, that whenever it happened to see her afterwards, it always growled, and made most violent struggles to get out to her. The prince, upon hearing of the circumstance, ordered the bear to be killed.

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A few years ago, a man exhibited at Edinburgh a bear, which it was discovered he chiefly fed with dead bodies taken from the burying-grounds. On complaint being made to the magistrates, they ordered the bear to be shot. What punishment was inflicted on the man we do not recollect.

3. *U. Maritimus*, the White or Polar Bear.—This species is considerably larger and longer than the common bear, having been sometimes found 12 feet in length. It is exceedingly strong and fierce, and its body is covered with a very long, thick, white fur. It inhabits the coldest regions of the north, and is sometimes carried on floating ice as far to the southward as Newfoundland. In winter it buries itself in the snow, where it lies in a torpid state; but in summer it takes up its residence in the cliffs and caverns of the numerous ice islands that are found in those high latitudes. Here it brings forth its young, usually one or two at a birth. The parent is exceedingly tender and affectionate to her young, of which the following anecdote affords a striking and interesting example.

94 *Maritimus*, Polar Bear. Fig. 41.

While the Carcase frigate, which went out some years ago to make discoveries towards the north pole, was locked in the ice, early one morning the man at the mast-head gave notice that three bears were making their way very fast over the frozen ocean, and were directing their course towards the ship. They had, no doubt, been invited by the scent of some blubber of a sea-horse that the crew had killed a few days before, which had been set on fire, and drew out of the flames a part of the flesh of the sea-horse that remained unconsumed, and ate it voraciously. The crew from the ship threw great lumps of the flesh of the sea-horse, which they had still left, upon the ice, which the old bear fetched singly, laid every lump before her cubs as she brought it, and dividing it, gave to each a share, reserving but a small portion to herself. As she was fetching away the last piece, they levelled their muskets at the cubs, and shot them both dead, and in her retreat they wounded the dam, but not mortally. It would have drawn tears of pity from any but unfeeling minds, to have marked the affectionate concern expressed by this poor beast in the dying moments of her expiring young. Though she was herself dreadfully wounded, and could but just crawl to the place where they lay, she carried the lump of flesh she had fetched away, as she had done others before; tore it in pieces, and laid it before them; and when she saw that they refused to eat, she laid her paws first upon one, and then upon the other, and endeavoured to raise them up: all this while it was pitiful to hear her moan. When she found she could not stir them, she went off, and when she had got at some distance, looked back and moaned; and that not availing her to entice them away, she returned, and smelling round them, began to lick their wounds. She went off a second time as before, and having crawled a few paces, looked again behind her, and for some time stood moaning. But still, her cubs not rising to follow her, she returned to them again, and with signs of inexpressible fondness went round one, and round the other, pawing them, and moaning. Finding at last that they were cold

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cold and lifeless, she raised her head towards the ship, and uttered a growl of despair, which the murderers returned with a volley of musket-balls. She fell between her cubs, and died licking their wounds.

The polar bear lives chiefly on fish, but sometimes attacks the seals. He in his turn becomes a prey to the inhabitants of the arctic regions, who eat the flesh, though it is very coarse, and use the skin for coverings of various kinds.

95 *Luscus*, Wolverine.

5. *U. Luscus*, Wolverine.—This, by most naturalists, is considered only as a variety of the glutton. It is a large animal, almost equalling the wolf in size. It is pretty common in the northern parts of North America, where it burrows under ground. It is a beast of prey, living on deer and similar animals. Though its pace is very slow, it has a very acute scent, is extremely strong, and possessed of great sagacity. It is said to be so fierce, as to be a terror even to the wolves and bears; and its strength is so great, that it has been known to pull down a pile of immense logs of wood, in order to get at some provisions that had been hidden there, though some of the logs were as much as two men could carry. It is a great enemy to badgers and foxes.

It is hunted in North America for the sake of its skin.

96 *Meles*, Badger. Fig. 42.

7. *U. Meles*, The Badger.—This is an animal of a very clumsy make, being thick-necked and thick-bodied, with very short legs. His usual length from nose to tail is about two feet and a half, and the tail itself seldom exceeds six inches. His eyes are very small, ears short and rounded. The body is covered with long coarse hairs like bristles, that are of a dirty yellowish white next the root, black in the middle, and gray at the tips. The badger differs from most other animals in having his back of a lighter colour than his belly. He is exceedingly strong, especially about the legs and feet, which are formed for burrowing in the earth.

This animal is found in all the temperate parts of Europe and of Asia. It makes its habitation below ground, and is a very cleanly animal, so that when his retreat is defiled by any other animal, as the fox, he quits it for another. It seldom leaves its hole during the day, feeding only by night. Its principal food appears to consist of the smaller quadrupeds, as rabbits, birds, &c. though Mr Pennant will scarcely allow it to be a carnivorous animal. It is also said to be very fond of honey. It sleeps much during winter, confining itself like the bear, in a half torpid state.

The female brings forth three or four young in the early part of summer.

Badgers were formerly distinguished into sow badgers and dog badgers, from the supposed resemblance of their heads to those animals, though we do not know of any with a head like that of swine, its usual appearance being that of the dog.

No animal has suffered more from vulgar prejudices than the badger: harmless in his nature, he seems to have had the character of ferocity given him, merely because he is a beast of great strength, and is furnished with strong teeth, as if formed to live by rapine; he is, however, found to be an animal perfectly inoffensive. Nature has denied the badger the speed requisite to escape its enemies, but has supplied it with such weapons of offence that scarcely any creature will attack; few animals defend themselves better, or bite harder; when pursued, it soon comes to bay, and fights with great obstinacy. The badger is very tenacious of life, yet a small blow on the snout is mortal both to him and the otter. It is hunted with terriers, and its obstinate defence affords great diversion to those human brutes who are capable of finding pleasure in the torments of a harmless, inoffensive creature.

Feræ.

Its skin is used for pistol furniture, when dressed with the hair on; the hairs are made into brushes that are used by painters to soften their shades, and the flesh is said to make excellent bacon.

97 Didelphis.

Genus 20. Didelphis. *Opossums.*

Front teeth small and rounded; superior 10, the two middle ones longer; inferior eight, the two middle ones broader and very short; canine teeth long; grinders denticulated; tongue ciliated with papillæ; abdominal pouch (in most species) containing the teats.

This curious tribe of animals first became known to naturalists on the discovery of America, where only, most of the species are met with. They are principally distinguished by the extraordinary contrivance which nature has adopted for enabling most of the genus to secure their young, and which consists of a pouch or bag formed by a fold of the skin of the belly. Into this the young are received soon after birth, and are there suckled at teats within the bag, till they are able to shift for themselves. In some of these there are two or three distinct cavities that can be opened or shut at pleasure, by means of bones with which they are provided for that purpose. Some of the species carry their young on their backs, covering them with their tail.

This is a numerous genus, comprehending about 19 species.

1. *D. Virginiana*, Virginian O. Yellowish gray, with naked tail, and black, naked, rounded ears, edged with white.—2. *D. Marsupialis*, Molucca O. Brown, with naked tail.—3. *D. Cayopollin*, Mexican O. Brown, with tail longer than the body, and the eyes surrounded with a blackish border.—4. *D. Brachyura*, Short-tailed O. With hairy tail; very short, naked ears, reddish body, and no pouch.—5. *D. Brunii*, Javan O. Short naked tail, and long three-toed hind feet.—6. *D. Orientalis*, Phalanger. Rusty white beneath, with blackish dorsal line; tail of the length of the body, and hairy almost to the middle, and the two middle toes of the hind feet united.—7. *D. Cancrivora*, Cayenne O. Nearly naked; scaly tail almost the length of the body, and the nails of the thumbs flat.—8. *D. Philander*, Philander. The tail hairy at the base, and with four teats in the abdominal pouch.—9. *D. Murina*, Murine O. Tail half naked, and six teats.—10 *D. Dorsigera*, Merian O. Tail naked, hairy at the base, and the fore feet without claws.—11. *D. Lemurina*, Lemurine O. Ash-coloured, tawney beneath, with cylindric, black, furry, prehensile tail.—12. *D. Obesula*, Porcupine O. Subferruginous, whitish beneath, with longish tail; the fore feet five-toed, with small exterior claws; the hind feet four-toed, with two interior toes united.—13. *D. Petaurus*, Petaurine O. Blackish gray, tinged with ferruginous; whitish beneath

Feræ. beneath, with lateral flying membrane, and long, subcylindric, very villose tail.—15. *D. Sciurea*, Squirrel O. Pale gray, snow-white beneath, with lateral flying membraue, and very villose prehensile tail.—15. *D. Macroura*, Long-tailed O. Ash-coloured, whitish beneath, with lateral flying membrane, and very long black tail.—16. *D. Pygmæa*, Pygmy O. With lateral flying membrane, and flatly pinnated linear tail.—17. *D. Vulpina*, Vulpine O. Ferruginous, with black villous tail.—18. *D. Australasiaticus*, New Holland O.—19. *D. Ursina*, Ursine O. Yellowish, with cleft upper lip.

98 *Virginiana.* Virginian Opossum. Fig. 43. 1. *D. Virginiana*, Virginian Opossum.—This animal is about the size of a cat, but appears of a thicker form, from the length and erect position of the hair. It has an inelegant aspect, having a long sharp face, and very wide mouth, armed with numerous sharp teeth. The legs are short; and all the toes, except the thumbs of the hind feet, are furnished with sharp claws. The tail is strongly prehensile, enabling the animal to suspend itself thereby.

This is one of those species in which the abdominal pouch is most strongly marked, and into this receptacle the female receives her young when they are in danger, or when fatigued.

The Virginian opossum, like all the other American species, is a carnivorous animal, and preys on poultry, small birds, &c. in the manner of the European polecat; it is also frugivorous, eating several kinds of fruits, roots, &c. It is of a gentle disposition, and may easily be tamed; but, like some other species, it has a disagreeable smell. Its voice is a sort of grunting squeak; its pace in running is not swift, but it is very expert in climbing trees, and readily passes, by means of its clinging tail, from bough to bough, in the manner of a monkey. The female produces four or five at a birth, and has the power of closing the pouch so strongly as to make it extremely difficult to open it by the hand, nor will any torture compel the animal to loosen it. The female, when ready to bring forth her young, is said to make herself a nest of dry grass, in some bush near the root of a tree.

99 *Dorsigera.* Merian Opposum. Fig. 44. 10. *D. Dorsigera*, Merian O.—Almost the only account we have of this animal is given by Madame Merian, in her work on the insects of Surinam. Her account is as follows. "By way of filling up a plate, I have represented a kind of wood-rat, which always carries her young ones upon her back; she is of a yellowish brown colour, and white beneath. When these rats come out of their hole, either to play or to seek their food, they run about with their mother; but when they are satisfied with food, or are apprehensive of danger, they climb up again on the back of the mother, and twist their tails round that of the parent, who runs with them into her hole again."

100 Dasyurus.

Genus 21. DASYURUS.

The organs of generation and abdominal pouch in the female, as in the last genus. Front teeth in the upper jaw eight, in the lower six. Canine teeth, two in each jaw. Grinders 14, of which six are sharp. Head conical; snout furnished with large whiskers. Tail furnished with long hair. Five toes on each foot, all separate; the thumb of the hind feet extremely short.

History of the Species. This is a new genus, formed by Geoffroy, to comprehend several species which are placed by Dr Shaw under *Viverra* and *Didelphis*, but which Geoffroy thinks have sufficiently distinguishing characters to be separated from both. They are all found in New Holland, and are herbivorous animals.

Geoffroy enumerates six species, to which he gives the following names and characters.

1. *D. Macrourus*, Long-tailed D. Chesnut colour spotted with white. Tail equally speckled.—2. *D. Maugei*, Maugei D. Olive coloured, spotted with white; tail without spots.—3. *D. Viverrinus*, Viverrine D. Black, spotted with white; tail without spots.—4. *D. Tafa*, Tafa D. Entirely brown; tail of the same colour.—5. *D. Penicillatus*, Brush-tailed D. Ash-coloured, without spots.—6. *D. Minimus*, Least D. Entirely red; tail of the same colour.

101 Perameles. M. Geoffroy has also formed a new genus, which he calls Perameles, in which he includes the *didelphis obesula* of Shaw, and another species that had not before been described. As we are not very certain of the necessity of this new genus, we have not included it in the arrangement of the generic characters; and for a description of the genus, we must refer to Geoffroy's Memoir, in the fourth volume of *Annales de Museum National*, p. 56.

102 *Obesula.* Geoffroy calls the species Perameles *nasuta*, and P. *obesula*. The latter has been thus described by Dr Shaw. It is about the size of a half-grown domestic rat, and is remarkable for a thicker or more corpulent habit than most others of the genus. The hind legs are considerably longer than the fore legs, and have in miniature the form of those of the kanguroo, and some other Australasian quadrupeds; though the middle claws are far less in proportion; the interior ones are double, or both covered by a common skin. The colour of this species is a pale yellow brown, paler and inclining to whitish below; and its hair is of a coarser or harsher appearance than the rest of the small opossums; the ears are rounded, the tail rather long. When viewed in a cursory manner, the animal bears a distant resemblance to a pig in miniature.

103 Wombat. Fig. 46. In Collins's account of New South Wales, there is described a very curious animal under the name of *wombat*, which seems nearly allied to the opossums, and the other animals which we have just mentioned. The teeth, however, differ so much from those of the three last genera, that it can scarcely be ranked as a species of any of them, and perhaps it may hereafter constitute a new genus. The account given in the work referred to is as follows.

Its length, from the tip of the tail to the tip of the nose, is two feet seven inches, of which its body takes up one foot eleven inches. The head is seven inches, and the tail five-tenths of an inch. Its circumference behind the fore legs, 27 inches; across the thickest part of the belly, 31 inches. Its weight by hand is between 25 and 30 pounds. The hair is coarse, and is about one inch, or one and five-tenths in length, thinly set upon the belly, thicker on the back and head, and thickest upon the loins and rump; the colour of it a light sandy brown, of varying shades, but darkest along the back.

The head is large and flattish, and when looking the animal full in the face, seems, excluding the ears,

Feræ. to form nearly an equilateral triangle, any side of which is about seven inches and five-tenths in length; but the upper side, or that which constitutes the breadth of the head, is rather the shortest. The hair upon the face lies in regular order, as if it were combed, but its ends point upwards in a kind of radii, from the nose their centre.

The ears are sharp and erect, of two inches and three-tenths in length, stand well asunder, and are in nowise disproportionate. The eyes are small, and rather sunk than prominent, but quick and lively. They are placed about two inches and five-tenths asunder, a little below the centre of the imaginary triangle towards the nose. The nice co-adaptation of their ciliary processes, which are covered with a fine hair, seems to afford the animal an extraordinary power of excluding whatever might be hurtful.

The nose is large or spreading, the nostrils large, long, and capable of being closed. They stand angularly with each other, and a channel is continued from them towards the upper lip, which is divided like the hare's. The whiskers are rather thick and strong, and are in length from two to three inches and a half.

The opening of its mouth is small; it contains five long grass-cutting teeth in the front of each jaw, like those of the kanguroo; within them is a vacancy for an inch or more, then appear two small canine teeth of equal height with, and so much similar to, eight molares situated behind, as scarcely to be distinguishable from them. The whole number in both jaws amount to 24.

The neck is thick and short, and greatly restrains the motions of the head, which, according to the common expression, looks as if it were stuck upon the shoulders.

From the neck the back arches a little as far as the loins, whence it goes off at a flat slope to the hindermost parts, where not any tail is visible. A tail, however, may be found by carefully pressing the finger over the flat slope in a line with the back bone. After separating the hairs, it is seen of some half an inch in length, and from three-tenths to one-tenth of an inch in diameter, naked, except a few fine short hairs near its end. This curious tail seemed to hold a much bolder proportion in the young than in the full grown animal.

The fore legs are very strong and muscular: their length, to the sole of the paw, is five inches and a half, and the distance between them is five inches and a half. The paws are fleshy, round, and large, being one inch and nine-tenths in diameter. Their claws are five in number, attached to as many short digitations. The three middle claws are strong, and about nine-tenths of an inch in length; the thumb and little finger claws are also strong, but shorter than the others, being only seven-tenths of an inch long. The fleshy root of the thumb claw is stronger and more flexible than the others. The sole of the paw is hard, and the upper part is covered with the common hair, down to the roots of the claws which it overhangs. The hind legs are less strong and muscular than the fore; their length, to the sole, is five inches and a half; the distance between, about seven inches and a half. The hind paw is longer than the fore, but not less fleshy; its length is two inches and seven-tenths, in breadth two inches and three-fifths. The claws are four in number; the three inner ones are less strong, but about one-fifth of an inch longer than the longest of the fore claws, and there is a fleshy spur in the place of the thumb claw. The whole paw has a curve, which throws its fore part rather inward. History of the Species.

In size the two sexes are nearly the same, but the female is perhaps rather the heaviest.

In the opinion of Mr Bass, this wombat seemed to be very economically made; but he thought it unnecessary to give an account of its internal structure in his journal.

This animal has no claim to swiftness, as most men could run it down. Its pace is hobbling, like the awkward gait of a bear. It is mild and gentle, as becomes a grass-eater; but it bites hard, and is furious, when provoked. Mr Bass never heard its voice but then; it was a low cry, between a hissing and a whizzing, which could not be heard at a distance of above 40 yards. He chased one, and suddenly lifted it off the ground with his hands, and laid him along his arm like a child. It made no noice, nor any effort to escape. Its countenance was placid, and seemed as content as if Mr Bass had nursed it from its infancy. He carried it more than a mile, on his arm or his shoulder, which it took in good part; but when he secured his legs, in order to go into a bush to cut a specimen of new wood, its anger rose, and it snapped a piece from the elbow of Mr Bass's jacket with its grass-cutting teeth. Here their friendship ended, and the creature remained implacable all the way to the boat, and kicked till he was exhausted.

This circumstance seemed to prove, that with kind treatment the wombat might soon be rendered docile and affectionate; but let his tutor beware of giving him provocation, at least if he should be full grown.

Besides Furneaux island, the wombat inhabits the mountains to the west of Port Jackson. It lives below ground, being admirably formed for burrowing; but to what depth it descends, does not seem to be ascertained. According to the account given of it by the natives, the wombat of the mountains is never seen during the day, but lives retired in his hole, feeding only in the night; but that of the islands seems to feed in all parts of the day. His food is not well known, but it is probably varied according to the situation in which he may be placed. The stomachs of such as Mr Bass examined were distended by the coarse wiry grass; and he, as well as others, had seen the animal scratching among the dry ricks of sea-weed thrown upon the shores, though he could never discover what the animal was in search of.

Genus 22. Macropus. *Kanguroo.* 104 Macropus.

Front teeth in the upper jaw six, emarginated; in the lower jaw two, very large, long, sharp, and pointing forwards; grinders five on each side, both in the upper and lower jaw, distant from the other teeth; fore legs very short; hind legs very long; abdominal pouch in the female.

There are only two species at present known, viz.

1. *M. Major*, Great K. Brownish, with sharpish ears,

Feræ. and five-toed fore feet.—2. *M. Minor*, Rat K. or Kanguroo rat. Brown, ash-coloured below, with rounded ears, and four-toed fore feet.

These were ranked by Linnæus under the genus DIDELPHIS, but differ so much in many circumstances, that they have been very properly formed into a separate genus.

105 *Major*, Kanguroo. Fig. 47. 1. *M. Major*, Great K.—This animal was first discovered by Captain Cook's people, while at Botany Bay in New Holland, in 1770; and an interesting, though not strictly accurate account of it, is given in Captain Cook's first voyage. It is thus described by Shaw. The general size of the kanguroo is, at least, equal to that of a full grown sheep; the upper parts of the animal are small, while the lower are remarkably large in proportion; yet such is the elegance of gradation in this respect, that the kanguroo may justly be considered as one of the most picturesque of quadrupeds. The head bears some resemblance to that of a deer, and the visage is mild and placid; the ears are moderately large, of a slightly sharpened form, and upright; the eyes large, and the mouth rather small; the neck thin and finely proportioned, the fore legs extremely short, with the feet divided into five toes, each furnished with a sharp and somewhat crooked claw. From the breast downwards the body gradually enlarges, and again decreases a little towards the tail; the thighs and hind legs are extremely stout and long, and the feet are so constructed as to appear, at first sight, to consist but of three toes, of which the middle is by far the largest, and is furnished with a claw of great size and strength; the exterior toe is also furnished with a very strong claw, but far smaller than that of the middle one; and the interior consists of two very small toes united under a common skin, with their respective claws placed so close to each other as to appear like a split or double claw; the whole appearance of the foot bears a distant resemblance to that of a bird. The kanguroo rests on the whole length of the foot, which is callous, blackish, and granulated beneath. The colour of the animal is an elegant pale brown, lighter or more inclining to whiteness on the abdomen; the ventral pouch, or receptacle for the young, is situated in the same manner as in the opossums, and is extremely large and deep.

The dimensions of a full grown kanguroo are given as follows, in Governor Phillip's Voyage to Botany Bay, viz. eight feet from the tip of the nose to that of the tail: length of the tail three feet and an inch; of the head eleven inches; of the fore legs two feet; of the hind, three feet seven inches: circumference of the fore part of the animal near the legs, three feet nine inches; of the lower part near the legs, four feet five inches; round the thickest end of the tail 13 inches. The weight of the largest specimens is said to have been about 150 pounds; but it is imagined that this animal attains a much larger size.

Though the general position of the kanguroo, when at rest, is standing on its hind feet, yet it frequently places its fore feet on the ground also, and thus feeds in the manner of other quadrupeds. It drinks by lapping. In its natural state it is extremely timid, and springs from the sight of mankind by vast bounds of many feet in height, and to a surprising distance. When in a state of captivity, it has sometimes a way of springing forwards and kicking with its hind feet in a very forcible and violent manner; during which action it rests or props itself on the base of the tail. In a natural state it sometimes uses its tail as a weapon of defence, and will give such severe blows with it to dogs as to oblige them to desist from their attack. The female kanguroo has two mammæ situated in the abdominal pouch, and in each are seated two teats; yet so far as has hitherto been observed, the animal produces but one young at a birth; and so exceedingly diminutive is the young, when first found in the pouch, as scarcely to exceed an inch in length. The young continues in the pouch till it is grown to a large size, and takes occasional refuge in it long after it has been accustomed to come abroad. History of the Species.

The kanguroo feeds entirely on vegetable substances, and chiefly on grass. In their native state these animals are said to feed in herds of 30 or 40 together, and one is generally observed to be stationed, as if apparently on the watch, at a distance from the rest.

The flesh of the kanguroo is said to be rather coarse; and such as to be eaten rather in defect of other food than as an article of luxury.

Genus 23. TALPA. *MOLES.* 106 Talpa.

Front teeth in the upper jaw six, unequal; in the lower eight. Canine teeth one on each side, the upper larger. Grinders in the upper jaw seven, in the lower six.

The moles are furnished by nature for perforating the earth in the most expeditious manner. Their head is long, and provided with very strong muscles for enabling it to raise up the earth; their snout is much lengthened, and is moveable; their hands are large, broad, and flat, and armed with strong, flat, pointed claws, directed backwards for throwing the earth behind them, and the fore legs are very short and strong, and nearly hidden below the skin. They have no external ears, and their eyes are very small, and hidden in the fur. They mostly feed on worms and insects, and in this way would be of service, were it not that in seeking for these, they make much havock among young plants by turning up the earth. This circumstance renders them very troublesome to gardeners and farmers, who take every method to destroy them.

Naturalists have described about 7 species, viz. 1. * *T. Europæa*, Common M. Black (usually) with short tail and five-toed feet.—2. *T. Purpurascens*, Purple M. Black, with a gloss of purple, with white tail and five-toed feet.—3. *T. Capensis*, Cape M. Gold-green, with a gloss of copper colour, with three-toed fore feet.—4. *T. Rufa*, Red M. Red, with short tail; three-toed fore feet, and four-toed hind feet.—5. *T. Longicaudata*, Long-tailed M. Brown, with tail moderately long, and five-toed feet, hinder scaly.—6. *T. Radiata*, Radiated M. Black, with white feet, and nose radiated with papillæ.—7. *T. Fusca*, Brown M. Brown, with white feet and tail, and very broad fore feet.

Species 1. *T. Europæa*, Common M. *Moldwarp*, or *Moudiewarp*. 107 *Europæa*, Common Mole.

The figure of this animal is well known. Its eyes are so small that it was long doubted whether it really had

History of the Species.

had any. It has, however, been proved by dissections assisted by the microscope, that this animal not only has eyes, but that its eyes are every way calculated for distinct vision. It possesses the senses of hearing and smelling in a very acute degree, and according to Ray and Buffon is peculiarly gifted in another faculty, on which it would be improper here to enlarge. It is sometimes found white.

Moles are found in every part of Europe, and are extremely common in Britain.

These animals, as is well known, live below the earth, where they make subterranean passages leading from one hillock to another. They live in pairs, and are said to be the most domestic of all quadrupeds. They seldom quit their holes except when compelled to do so by heavy rains, or when the earth is so much parched by constant drought, that they are unable to continue their work of burrowing. In winter they retire to elevated places, where they may be best secured from inundations; but in summer descend to the low and flat lands, especially meadows, which they prefer on account of the earth there being fresher and softer.

They generally breed in the spring, being found big with young in January and February, and in April a great many of their young may be seen.

It appears that moles are capable of swimming to a considerable distance; and a remarkable instance of one having been seen swimming towards a small island in the middle of a lake 180 yards from land, is given by Mr Bruce in the third volume of the Linnæan Transactions.

People in general are not aware of the great mischief occasioned in fields and gardens by these animals. We are however informed by Buffon, that in the year 1740, he planted 15 or 16 acres of land with acorns, and that the greater part of them was in a little time carried away by the moles to their subterranean retreats. In many of these there were found half a bushel, and in others a bushel. Buffon, after this circumstance, caused a great number of iron traps to be constructed, by which in less than three weeks he caught 1300. To this instance of the devastation occasioned by these animals, we may add the following: In the year 1742 they were so numerous in some parts of Holland, that one farmer alone caught between 5000 and 6000 of them. The destruction occasioned by these animals is however no new phenomenon. We are informed by history, that the inhabitants of the island of Tenedos, the Trojans, and the Æolians, were infested by them in the earliest ages. For this reason a temple was erected to Apollo Smynthius, the destroyer of moles.

The catching of moles constitutes a profession which is well understood in this country. For the particular modes of taking them, we must refer our readers to Dr Darwin's Phytologia, p. 370, and to the second volume of the Philosophical Magazine, p. 34. According to Mortimer, as quoted by Pennant, the roots of white hellebore made into a paste and laid into their holes, will destroy them. They seem to have few enemies among other animals, but we are told by Sir Robert Sibbald, that there is a kind of mouse with a beak that destroys moles. We are assured that these animals are not found in Ireland.

The skin of the mole is extremely tough; its fur close set, and softer than the finest velvet, or perhaps than the fur of any other animal; it is usually black, but moles have been found spotted with white, and sometimes, though rarely, they have been seen altogether white.

Feræ.

Genus 24. SOREX. *SHREWS.*

108
Sorex.

Front teeth in the upper jaw two, long, bifid. In the lower two or four; the intermediate ones shorter; canine teeth several on each side; grinders cuspidated.

This genus is nearly allied to the last, and indeed a few of its species are scarcely to be distinguished from some of the moles. It is therefore not surprising that Linnæus, in the twelfth edition of his Systema Naturæ, ranked two species under *Sorex*, which should more properly have been placed under *Talpæ*.

There are 16 species, which are thus distinguished. 1. * *S. Araneus*, Common S. or Shrew mouse. Rusty brown, whitish below, with tail rather shorter than the body.—2. *S Moschatus*, Musk S. Web-footed, with naked compressed tail.—3. *S. Radiatus*, Canada S. Blackish, with lengthened snout, radiated at the tip with tentacula.—4. *S. Cærulescens*, Perfuming S. Blue-gray, with flesh-coloured snout, feet, and tail.—5. *S. Fodiens*, Water S. Black, and white below.—6. *S. Braziliensis*, Brazilian S. Brown, with three black stripes on the back.—7. *S. Surinamensis*, Surinam S. Bay, yellowish ash colour below, with tail shorter than the body.—8. *S. Proboscideus*, Elephant S. Brown, with very long cylindric snout.—9. *S. Leucodon*, White-toothed S. Dusky, white below, with tail of middling length.—10. *S. Tetragonurus*, Square-tailed S. Quadrangular tail.—11. *S. Leucurus*, White-tailed S. Brownish, whitish beneath, with short tail, whitish towards the tip.—12. *S. Unicolor*, Cinereous S. Dusky ash-coloured, with tail narrowed at the base.—13. *S. Murinus*, Murine S. Brown, with ash-coloured feet and tail, the latter of middling length.—14. *S. Pusillus*, Persian S. With rounded ears and short subdistichious tail.—15. *S. Minutus*, Minute S. With very long snout.—16. *S. Exilis*, Pygmy S. Extremely small, with very thick cylindric tail.

109
Araneus, Common Shrew. Fig. 49.

1. *S. Araneus*, Shrew Mouse, or Hardy S. The length of this little animal, from the end of the nose to the origin of the tail, is two inches and a half; that of the tail, near one inch and a half; the nose is very long and slender, and the upper mandible is much longer than the lower; the ears are short and rounded; the eyes very small, and like those of the mole, almost concealed in the hair. The colour of the head, and upper part of the body, is of a brownish dark red, the belly of a dirty white; the tail is covered with short dark hairs; the legs are very short; the hind legs are placed very far back; the feet are divided into five distinct toes.

The teeth are 28 in number, and of so singular a form as to engage the attention of most naturalists. Gesner is of opinion, that nature seems to have formed in this animal teeth of mixed shape, between those of mice and serpents; the two upper fore teeth are very sharp, and on each side of them grows a minute pro-

cess,

Feræ.

cess, scarcely visible, except on a near inspection; the other teeth are placed close together, are very small, and seem scarcely separated.

The shrew mouse inhabits old walls, heaps of stones, or holes in the earth; is frequently found near outbuildings, hay ricks, dunghills, and necessary houses; it lives on insects, corn, and any filth, and has been observed rooting like a hog in the last-named places. Either from its food or its nature, it has a very disagreeable smell, insomuch that the cat will kill it, yet refuses to eat it. It is said to bring four or five young at a time. It is a very common animal in this country.

110 Erinaceus.

Genus 25. Erinaceus. *Hedgehogs.*

Front teeth, two both above and below; those of the upper jaw distant, of the lower approximated. Canine teeth on each side, in the upper jaw five, in the lower three. Grinders on each side, both above and below, four. Body covered on the upper parts with spines.

There are five species, viz. 1. * *Erinaceus Europæus*, European or Common H. With rounded ears and crested nostrils.—2. *E. Inauris*, Earless H. Without external ears.—3. *E. Auritus*, Long-eared H. With long oval ears, and crested nostrils.—4. *E. Madagascariensis*, Striped H. With spines and long bristles; the body longitudinally banded with black and white, with long, sharp-pointed snout.—5. *E. Malaccensis*, Malacca H. With long spines and pendulous ears.

111 *Europæus*, Common Hedgehog. Fig. 50.

1. *Erinaceus Europæus*, Common Hedgehog, or Urchin.

The usual length of this animal, exclusive of the tail, is about ten inches; the tail is little more than an inch long, but so concealed by the spines as scarcely to be visible. The snout is like that of the hog; the upper jaw being much longer than the lower, and the end flat; the nostrils are narrow, terminated on each side by a loose thin flap; the colour of the snout is dusky; it is covered with a few scattered hairs; the upper part of the head, the sides, and the rump, are clothed with strong stiff hair, approaching the nature of bristles, of a yellowish and ash hue.

The legs are short, of a dusky colour, and almost bare; the toes on each foot are five in number, long, and separated the whole way; the thumb or interior toe is much shorter than the others; the claws long but weak; the whole upper part of the body and sides are strongly covered with close spines of an inch in length, and very sharp pointed; their lower part is white, the middle black, the points white. The mouth is small, but full of teeth. The barbarity of anatomists furnishes us with an amazing instance of its patience; one that was dissected alive, and whose feet were nailed down to the table, endured that, and every stroke of the operator's knife, without even one groan.

It is found in most parts of Europe, and is not uncommon in this island.

It produces four or five young at a birth, which are soon covered with prickles like those of the parent, but shorter and weaker.

It is a nocturnal animal, keeping retired in the day, but is in motion the whole night in search of food. It generally resides in small thickets, in hedges, or in ditches covered with bushes, lying well wrapped up in moss, grass, or leaves; its food is roots, fruits, worms, and insects. It lies under the undeserved reproach of sucking cattle, and hurting their udders; but the smallness of its mouth renders that impossible. It is a mild, helpless, and patient animal; and would be liable to injury from every enemy, had not providence guarded it with a strong covering, and the power of rolling itself into a ball, by that means securing the defenceless parts. It is hunted with dogs; but few of them will venture to attack it while rolled up, so that its persecutors throw it into water, to oblige it to unroll itself. Its flesh is esteemed good food.

History of the Species.

The hedgehog may be tamed; and we are told of one that lived at the Angel inn at Felton in Northumberland in 1799, which performed the duty of a turnspit, as well in every respect as the dog of that name; ran about the house as familiarly as any other domestic quadruped; displayed a facility till then unknown in this species of animals; and used to answer to the name of *Tom*.

This order contains 12 genera, and about 184 species.

Chap. IV. Glires.

Gen. 26. Hystrix. *Porcupine.*

112 Hystrix.

Front teeth two, both in the upper and under jaw, obliquely cut; grinders eight, Body covered with spines intermixed with hairs. Four toes on the fore feet, five on the hind.

There are six species; viz.

1. *H. Cristata*, Long-spined Porcupine; with four-toed fore feet, and five-toed hind feet; crested head, and short tail.—2. *H. Prehensilis*, Prehensile P. Short-spined, with four-toed feet; and long half-naked prehensile tail.—3. *H. Mexicana*, Mexican P. Short-spined, with four-toed feet, and tail of moderate length.—4. *H. Macroura*, Long-tailed P. Short-spined, with five-toed feet, and very long tail, tufted at the end with club-shaped bristles.—5. *H. Fasciculata*, Brush-tailed P. Four-toed fore feet, five-toed hind feet, and tail terminated by a tuft of flattened bristles.—6. *H. Dorsata*, Canada P. Short-spined, with very long fur; four-toed fore feet, five-toed hind feet; spiny back, and shortish tail.

113 *Cristata*, Common Porcupine. Fig. 51.

1. *H. Cristata*, Common Porcupine.—The figure which we have given of this animal will convey a better idea of it than any description. We may remark only that it is about two feet long from head to tail; and that the tail is about four inches long, being almost entirely hidden by the quills and long hair.

It is a native of Africa, India, and the Indian islands; and is found in some of the warmer parts of Europe, particularly in Sicily and Malta.

It was long believed that the porcupine had the power of darting its quills to a considerable distance, at any enemy that assaulted it. This is proved to have been a vulgar error, arising probably from the manner in which the quills are detached when the animal is moulting, at which time they are often thrown with a jerk to a little distance. The quills seem intended merely as weapons of defence, and when attacked, the animal has the power of raising them, as was remarked with respect to the scales of the manis.

The

History of the Species.

The flesh of the porcupine is eaten in some places; and we are told by Mr Brydone, that when in Sicily, he dined on it, and found it extremely luscious, soon palling on the appetite.

This animal feeds chiefly on fruits, roots, and vegetable substances. It commonly lives under ground, sleeps much by day, and goes in search of food only during the night. The female produces two young at a birth, and these, when taken early, are easily tamed.

114 Cavia.

Gen. 27. CAVIA, *Cavy.*

Front teeth two, wedge-shaped; grinders eight. Toes on the fore feet, four or five; on the hind feet, from three to five. Tail very short, or wanting. No clavicles.

The animals of this genus are chiefly found in America; they live on vegetable substances, and inhabit holes in the ground, or beneath the roots of trees. There are seven species; viz.

1. *Cavia Cobaya*, Variegated Cavy, or Guinea Pig. Tailless; generally variegated either with black and white, or rufous, &c.—2. *C. Paca*, Spotted C. Tailed; with five-toed feet, and sides marked by rows of yellowish white spots.—3. *C. Capybara*, Capybara. Tailless; with three-toed palmated hind feet.—4. *C. Aguti*, Aguti. Tailed; with the body reddish brown, and the belly yellowish.—5. *C. Acouchy*, Acouchy. Tailed; with olive-coloured body.—6. *C. Aperia*, Rock C. Tailless; with reddish ash-coloured body.—7. *C. Patagonica*, Patagonian C. Rusty gray, whitish below, with extremely short naked tail; large white patch on each thigh, and black rump.

115 *Cobaya.* Guinea Pig.

1. *C. Cobaya*, Restless Cavy, or Guinea Pig.—This animal is pretty well known among us, being frequently kept as a kind of pet. It is a native of South America, and naturally of a chilly tender constitution; yet it lives and breeds in our climates when kept in the house, and properly fed. Few animals breed so early as the Guinea pig. Though it does not attain its full growth till eight or nine months old, it has been known to bring forth at two months. The female goes with young about three weeks, and at her first litter produces four or five young, but her subsequent litters often consist of ten or twelve. As these animals are thus prolific, and will breed five or six times in a year, it is computed that a thousand of them may be produced in one year from a single pair. They seem capable of no sentiment but the lowest sensuality, and pass their whole time in eating, sleeping, &c. They live entirely on vegetable food, and are very fond of parsley, apples, and other fruits. They eat often, but little at a time.

They are very neat and cleanly, and are often seen dressing each other's fur. They are easily tamed, but seem to feel no attachment to man. They grunt like a pig, make a chirping noise when pleased, and utter a sharp cry when hurt.

The flesh may be eaten, but is very indifferent.

116 Castor.

Gen. 28. CASTOR. *BEAVER.*

Front teeth in the upper jaw truncated, and hollowed with a transverse angle; in the lower jaw transverse at the tips. Grinders on each side four. Tail long, depressed and scaly. Collar bones in the skeleton. Glires.

There are two species; viz. 117

1. *C. Fiber*, Common Beaver. Chesnut-coloured, with flat ovate naked tail.—2. *C. Huidobrius*, Chili B. With long, compressed, lance-shaped, hairy tail; lobed fore feet, and webbed hind feet. *Fiber.* Common Beaver. Fig. 52.

1. *C. Fiber*, Common Beaver.—This animal is easily distinguished from all quadrupeds by the peculiar appearance of its tail, which is of an oval form, nearly flat, except on its upper surface, where it is slightly convex, entirely destitute of hair, except at the base, and marked with scaly divisions like the skin of a fish. The body is about three feet long, and the tail about a foot in length. The general colour of the fur is a deep chesnut, but it is sometimes found perfectly black, white, cream-coloured, or spotted.

The beaver is found in most of the northern parts of Europe and Asia, and is very abundant in North America. It was once met with in Britain, but the species has long been there extinct. It delights in shady watery situations.

Many accounts have been given of the manners and labours of this extraordinary animal, but we believe none are in general more correct than the following by Buffon.

The beavers begin to assemble in the month of June or July, for the purpose of uniting into society. They arrive in numbers from all corners, and soon form a troop of 200 or 300. The place of rendezvous is generally the place fixed for their establishment, and is always on the banks of waters. If the waters be flat, and never rise above their ordinary level, as in lakes, the beavers make no bank or dam; but in rivers or brooks, where the waters are subject to risings and fallings, they build a bank, and by this artifice they form a pond or piece of water which remains always at the same height. The bank traverses the river from one side to the other, like a sluice, and it is often from 80 to 100 feet long, by 10 or 12 broad at the base. This pile, for animals of a size so small, appears to be enormous, and supposes an incredible labour. But the solidity with which the work is constructed is still more astonishing than its magnitude. The part of the river where they erect this bank is generally shallow. If they find on the margin a large tree, which can be made to fall into the water, they begin with cutting it down, to form the principal part of their work. This tree is often thicker than the body of a man. By gnawing the foot of the tree with their four cutting teeth, they accomplish their purpose in a very short time, and always make the tree fall across the river. They next cut the branches from the trunk to make it lie level. These operations are performed by the whole community. Several beavers are employed in gnawing the foot of the tree, and others in lopping off the branches after it has fallen. Others at the same time traverse the banks of the river, and cut down smaller trees, from the size of a man's leg to that of his thigh. These they dress, and cut to a certain length to make stakes of them, and first drag them by land to the margin of the river, and then by water to the place where the building is carrying on. These piles they sink down, and

Glires.

and interweave the branches with the larger stakes. This operation implies the vanquishing of many difficulties; for to dress these stakes, and to put them in a situation nearly perpendicular, some of the beavers must elevate, with their teeth, the thick ends against the margin of the river, or against the cross tree, while others plunge to the bottom, and dig holes with their fore feet, to receive the points that they may stand on end. While some are labouring in this manner, others bring earth, which they plash with their feet, and beat firm with their tails. They carry the earth in their mouths, and with their fore feet, and transport it in such quantities that they fill with it all the intervals between the piles. These piles consist of several rows of stakes of equal height, all placed opposite to each other, and extend from one bank of the river to the other. The stakes facing the under part of the river, are placed perpendicularly; but the rest of the work slopes upwards, to sustain the pressure of the fluid, so that the bank, which is 10 or 12 feet wide at the base, is reduced to two or three at the top. It has, therefore, not only all the necessary thickness and solidity, but the most advantageous form for supporting the weight of the water, for preventing its issue, and to repel its efforts. Near the top, or thinnest part of the bank, they make two or three sloping holes, to allow the surface water to escape, and these they enlarge or contract, according as the river rises or falls; and when any breaches are made in the bank by sudden or violent inundations, they know how to repair them as soon as the water subsides.

It would be superfluous, after this account of their public work, to give a detail of their particular operations, were it not necessary, in a history of these animals, to mention every fact, and were not the first great structure made with a view to render their smaller habitations more commodious. These cabins or houses are built upon piles near the margin of the pond, and have two openings, the one for going to the land, and the other for throwing themselves into the water. The form of the edifices is either oval or round, some of them larger and some less, varying from four or five, to eight or ten feet diameter. Some of them consist of three or four stories, and their walls are about two feet thick, raised perpendicularly upon planks, or plain stakes, which serve both for foundations and floors to their houses. When they consist but of one story, the walls rise perpendicularly only a few feet, afterwards assume a curved form, and terminate in a dome or vault, which serves them for a roof. They are built with amazing solidity, and neatly plastered both without and within. They are impenetrable to rain, and resist the most impetuous winds. The partitions are covered with a kind of stucco, as nicely plastered as if it had been executed by the hand of man. In the application of this mortar, their tails serve for trowels, and their feet for plashing. They employ different materials, as wood, stone, and a kind of sandy earth, which is not subject to dissolution in water. The wood they use is almost all of the light and tender kinds, as alders, poplars, and willows, which generally grow on the banks of rivers, and are more easily barked out, and transported, than the heavier and more solid species of timber. When they once attack a tree, they never abandon it till they cut it down, and carry it off. They always begin the operation of cutting at a foot, or a foot and a half above ground; they labour in a sitting posture; and, besides the convenience of this situation, they enjoy the pleasure of gnawing perpetually the bark and wood, which are most palatable to their taste; for they prefer fresh bark and tender wood to most of their ordinary aliment. Of these provisions they lay up ample stores, to support them during the winter; but they are not fond of dry wood. It is in the water, and near their habitations, that they establish their magazines. Each cabin has its own magazine, proportioned to the number of its inhabitants, who have all a common right to the store, and never pillage their neighbours. Some villages are composed of 20 or 25 cabins. But these large establishments are rare, and the common republic seldom exceeds 10 or 12 families, of which each has his own quarter of the village, his own magazine, and his separate habitation. They allow no strangers to sit down in their neighbourhood. The smallest cabins contain 2, 4, or 6, and the largest 18, 20, and, it is alleged, sometimes 30 beavers. They are almost always equally paired, being the same number of females as of males. Thus, upon a moderate computation, the society is often composed of 150 or 200, who all, at first, laboured jointly, in raising the great public building, and afterwards in select tribes or companies, in making particular habitations. In this society, however numerous, an universal peace is maintained. Their union is cemented by common labours, and it is rendered perpetual by mutual convenience, and the abundance of provisions which they amass, and consume together. Moderate appetites, a simple taste, an aversion against blood and carnage, deprive them of the idea of rapine and war. They enjoy every possible good, while man only knows how to pant after it. Friends to each other, if they have some foreign enemies, they know how to avoid them. When danger approaches, they advertise one another by striking their tail on the surface of the water, the noise of which is heard at a great distance, and resounds through all the vaults of their habitations. Each takes his post; some plunge into the lake, others conceal themselves within their walls, which can only be penetrated by the fire of heaven or the steel of man, and which no animal will attempt either to open or to overturn. These retreats are not only very safe, but neat and commodious. The floors are spread over with verdure; the branches of the box and the fir serve them for carpets, upon which they permit not the least dirtiness. The window that faces the water answers for a balcony to receive the fresh air, and to bathe. During the greatest part of the day, they sit on end, with their heads and anterior parts of the body elevated, and their posterior parts sunk in the water. This window is made with caution, the aperture of which is sufficiently raised to prevent its being stopped up with ice, which, in the beaver climates, is often two or three feet thick. When this happens, they slope the sole of the window, cut obliquely the stakes which support it, and thus open a communication with the unfrozen water. This element is so necessary, or rather so agreeable to them, that they can seldom dispense with it. They often swim a long way under the ice; it is then that they are most easily taken, by attacking the cabin on one hand, and, at the same time, watching at a hole made at some distance.

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distance, where they are obliged to repair for the purpose of respiration. The contiuual habit of keeping their tail and posterior parts in the water, appears to have changed the nature of their flesh. That of their anterior parts, as far as the reins, has the taste and consistence of the flesh of land or air animals; but that of the tail and posteriors has the odour and all the other qualities of fish. The tail, which is a foot long, an inch thick, and five or six inches broad, is just like an extremity or genuine portion of a fish attached to the body of a quadruped. It is entirely covered with scales, and with skin perfectly similar to those of large fishes. They may be scraped off with a knife, and, after falling, they leave an impression on the skin, as is the case with all fishes.

It is in the beginning of summer that the beavers assemble. They employ the months of July and August in the construction of their bank and cabins. They collect, in September, their provisions of bark and wood; afterwards they enjoy the fruits of their labours, and taste the sweets of domestic happiness. This is the time of repose and the season of love. Knowing and loving one another from habit, from the pleasures and fatigues of a common labour, each couple join not by chance, nor by the pressing necessities of nature, but unite from choice and from taste. They pass together the autumn and the winter, and perfectly satisfied with each other, they never separate. At ease in their cabins, they go not out but upon agreeable or useful excursions, to bring in supplies of fresh bark, which they prefer to what is too dry, or too much moistened with water. The females are said to go pregnant for four months: they bring forth in the end of winter, and generally produce two or three young ones. About this time, they are left by the males, who retire to the country to enjoy the pleasures and the fruits of the spring. They return occasionally to their cabins, and are occupied in nursing, protecting, and rearing their young, who at the end of a few weeks, are in a condition to follow their dams. The females, in their turn, make little excursions to recruit themselves by the air, by eating fresh bark and herbage; and in this manner pass the summer upon the waters, and in the woods. They assemble not again till autumn, unless their banks or cabins be overturned by inundations; for when accidents of this kind happen, they suddenly collect their forces, in order to repair the breaches which have been made.

Some places they prefer to others for their habitations; and they have been observed, after having their labours frequently destroyed, to return every summer to repair them, till being fatigued with this persecution, and weakened by the loss of several of their numbers, they took the resolution of changing their abode, and of retiring to solitudes still more profound. It is in winter that they are chiefly sought by the hunters, because their fur is not perfectly sound in any other season: and, after their village is ruined, and numbers of them are taken, the society is sometimes too much reduced to admit of a fresh establishment; but those which escape death or captivity, disperse and become vagabond. Their genius, withered by fear, never again expands. They hide themselves and their talents in holes; or, sunk to the condition of other animals, they lead a timid and solitary life. Occupied only by pressing wants, and exerting solely their individual powers, they lose for ever those social qualities which we have been so justly admiring. Glires.

The beaver is hunted for the sake of its fur, which, as is well known, forms a considerable article in the manufacture of fine hats, as well as for the drug called *Castor*, for an account of which see MATERIA MEDICA. Its flesh is eaten in some places, and is said to have a fishy taste.

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Genus 29. MUS. *RATS AND MICE.* Mus.

Upper front teeth wedge-shaped. Grinders on each side three, sometimes only two. Clavicles or collar-bones in the skeleton.

These animals generally live in holes in the ground, are very swift, and able to climb trees. Their food is chiefly vegetable, which most of them seek in the night, keeping in their retreats during the day. They feed in a somewhat upright position, carrying the food to their mouth with their paws. They are very prolific, the females breeding many times a year and bringing numerous litters. The females have usually eight teats. The ears of these animals are usually short and rounded; their fore feet are commonly four-toed, with a warty excrescence in place of a fifth. Many of them are almost amphibious, living much in the water and swimming very well. A few of them are furnished with cheek pouches for carrying food to their holes. They are found in almost all parts of the world, and many of them are natives of Britain.

The species are very numerous, and are therefore by Dr Shaw distributed into the following sections.

A. *With flattened tails.*

1. *M. Zibethicus*, Musk Rat. Rusty brown, with long compressed lanceolate tail, and unwebbed feet.

B. *With round naked tails.*

2. *M. Pilorides*, Piloris. Whitish, with longish, scaly, obtuse truncated tail.—3. *M. Caraco*, American rat. Gray, with long, scaly, somewhat obtuse tail, and slightly semi-palmated hind feet.—4. * *M. Decumanus*, Norway R. Gray, stiff-haired, with very long scaly tail, and body whitish below.—5. * *M. Rattus*, Black R. Blackish, ash-coloured beneath, with very long scaly tail.—6. *M. Malabaricus*, Bandicot R. Gray, with naked round ears, and the two exterior toes of the hind feet shorter than the rest.—7. *M. Perchal*, Perchal R. Rusty brown, with the hind legs larger than the fore.—8. *M. Musculus*, Common M. Brown, ash-coloured beneath, with four-toed fore-feet, five-toed hind feet, and long nearly naked tail.—9. * *M. Sylvaticus*, Wood M. Yellowish brown, with long naked tail, and body white beneath, the colours being abruptly separated on the sides.—10. *M. Agrarius*, Rustic M. Yellowish brown, with long scaly tail and black dorsal streak.—11. *M. Messorius*, Harvest M. Rusty, white beneath, with long slightly hairy tail, and ears longer than the fur of the head.—12. *M. Minutus*, Minute M. Rusty, whitish beneath, with long scaly tail.—13. *M. Soricinus*, Soricine M. Yellowish gray, with long snout, round furred ears, and hairy tail of moderate length.—14. *M. Vagus*, Wandering M. Ash-coloured, with black dorsal band, very long naked tail, and plaited ears.—15. *M. Betulinus*,

Glires. *tulinus*, Birch M. Fulvous, with black dorsal band, plaited ears, and very long naked tail.—16. *M. Striatus*, Streaked M. Rufous brown, with longish naked tail, and the body marked by several longitudinal rows of white spots.—17. *M. Barbarus*, Barbary M. Brown, marked with ten pale streaks; with tail of middling length, three-toed fore feet, and five-toed hind feet.

C. *With hairy tails, in general either of a middling length or short.*

18. *M. Cyanus*, Blue R. Blue, whitish beneath, with four-toed fore feet, five-toed hind feet, and slightly hairy tail of middling length.—19. *M. Saxatilis*, Rock R. Grayish brown, with longish tail; ears longer than the fur, and feet about four-toed.—20. *M. Amphibius*, Water R. Blackish brown, ash-coloured below, with ears scarcely projecting from the fur; fore feet about four-toed, and tail about half as long as the body.—21. *M. Scherman*, Scherman R. Deep brown, ash-coloured below, with slightly hairy tail of moderate length, small feet, and ears shorter than the fur.—22. *M. Lemmus*, Lemming R. Short-tailed, with ears shorter than the fur, five-toed fore feet, and body white below, variegated above with black, white and fulvous.—23. *M. Arvalis*, Meadow M. Dusky rusty, short-tailed, deep ash-coloured beneath, with ears longer than the fur, and about four-toed fore feet.—24. *M. Torquatus*, Collared M. Short-tailed, rusty, with dusky variegations; ears shorter than the fur; five-toed fore feet, interrupted white collar, and black spinal stripe.—25. *M. Lagurus*, Hare-tailed M. Short-tailed, ash-coloured, white below; ears shorter than the fur; about four-toed fore feet, and black dorsal line.—26. *M. Economus*, Economic R. Short-tailed, tawney whitish below, with naked ears concealed by the fur, and about four-toed fore feet.—27. *M. Alliarius*, Garlick M. Ash-coloured, whitish below, with rather large ears slightly hairy, and tail about an inch long.—28. *M. Rutilus*, Red M. Fulvous ash-coloured beneath, with tail about an inch long; ears longer than the fur, and about four-toed feet.—29. *M. Laniger*, Woolly M. Ash-coloured, with four-toed fore feet, five-toed hind feet, and tail of middling length.—30. *M. Gregalis*, Baikal M. Gray, with ears shorter than the fur, about four-toed fore feet, and tail about one inch and a half long.—31. *M. Socialis*, Social M. Pale gray, white beneath, with very short rounded ears, about four-toed fore feet, and tail of half an inch long.—32. *M. Hudsonius*, Hudson's Bay M. Short-tailed, carless, ash-coloured, white beneath, with yellowish brown dorsal stripe, and five-toed hind feet.

D. *With cheek pouches for the temporary reception of their food.*

33. *M. Cricetus*, Hamster R. Reddish brown, pouched, with three white spots on each side, and deep black belly.—34. *M. Bursarius*, Canada R. Ash-coloured, with short nearly naked tail, pouched cheeks, and the claws of the fore feet very large, and formed for burrowing in the ground.—35. *M. Accedula*, Yaik R. Yellowish gray, whitish beneath, with pouched cheeks and sinuated ears.—36. *M. Arenarius*, Sand R. Ash-coloured, pouched; with the feet, sides of the body, belly and tail white.—37. *M. Phæus*, Astracan M. Ash-brown, pouched, white beneath.—38. *M. Songarus*. Ash-coloured, pouched, white beneath, with black spinal line, and the sides spotted with white.—39. *M. Furunculus*, Baraba R. Yellowish gray, pouched, whitish beneath, with black dorsal streak. History of the Species.

E. *Subterrancan or Ground Rats, resembling Moles in habit and manner of life.*

40. *M. Maritimus*, Coast R. Pale yellowish brown, whitish beneath, with very large and long naked teeth, five-toed feet, no external ears, and short tail.—41. *M. Typhlus*, Blind R. Short-tailed, rufous brown, dusky beneath, with five-toed fore feet, broad front teeth, and without eyes or external ears.—42. *M. Aspalax*, Daurian R. Short-tailed, earless, yellowish ash-coloured, with large wedged fore teeth, and long claws on the fore feet.—43. *M. Capensis*, Cape R. Short-tailed, reddish ash, paler below, with very large naked fore teeth, five-toed feet, and white muzzle.—44. *M. Talpinus*, Mole R. Short-tailed, brown, with large wedged front teeth, no external ears, and five-toed fore feet formed for burrowing.

119 *Decumanus*, Norway Rat.

4. * *M. Decumanus*, Common brown or Norway rat. —This is one of the most common species of rat, by which our houses and granaries are infested, and is too well known to require any description. It was originally, it is said, brought to this country from Norway, and has multiplied so prodigiously, and is so strong and voracious, as to form one of our most unpleasant inmates. St Pierre informs us, that in the Isle of France these rats are found in such prodigious swarms, that 30,000 of them have been killed in some of the houses in a single year. It is even said that the Dutch entirely abandoned that post from the number of rats by which it was infested. They will in a single night entirely destroy a whole crop of corn. They frequently infest ships in such numbers as to destroy large quantities of provisions, and even endanger the vessel, by gnawing its timbers. When the Valiant came from the Havannah, in the year 1766, the rats had increased on board her so much as to destroy nearly one hundred weight of biscuit in a day; and on the ship being smoked between decks, to suffocate the rats, six hampers were for some time filled every day with those that had been thus killed.

In summer it frequents the banks of rivers, ponds, and ditches; where it lives on frogs, fishes, and small animals. But its rapacity is not confined entirely to these: It destroys rabbits, poultry, young pigeons, &c. It infests the granary, the barn, and the store-house; does infinite mischief among corn and fruit of all kinds; and, not content with satisfying its hunger, frequently carries off large quantities to its hiding place. It is a bold and fierce little animal; and when closely pursued, will turn and fasten on its assailant. Its bite is keen, and the wound it inflicts is painful, and difficult to heal, owing to the form of its teeth, which are long, sharp, and irregular.

Their produce is enormous, as the female brings forth from 12 to 18 at a litter, and usually breeds thrice a year, so that from a single pair, provided food were sufficiently plentiful, and they had no enemies to diminish their numbers, there might be propagated above 1,000,000 in the space of two years! Their enemies are, however, numerous. They are destroyed by dogs,

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dogs, cats, and especially weasels; and it is said that a strong rat is as much dreaded by its own species, as the whole race is by those animals that are their prey. They are commonly taken by traps, or destroyed by poison, which latter is the surest method. Mr Bewick recommends for the purpose a composition of *nux vomica* mixed with oatmeal, and a small proportion of musk and oil of rhodium.

120 Hamster. Fig. 54.

33. *M. Cricetus*, Hamster, or Hamster Rat.—This is one of the fiercest of the rat tribe, being rather larger and much stronger than the Norway rat. It is of a pale reddish brown colour above, and blackish below, with a whitish muzzle, reddish cheeks, pretty large rounded ears, and a short tail almost bare. The male is always larger than the female.

The hamster is the only European species of rat that is furnished with pouches. It is found in Austria, Silesia, and many parts of Germany. It lives under ground, burrowing down obliquely. At the end of its passage, the male sinks one perpendicular hole, and the female several, sometimes seven or eight. At the end of these are formed various vaults, either as lodges for themselves and young, or as store-houses for food. Each young has its different apartment, and each sort of grain its different vault; the former is lined with straw or grass. The vaults are of different depths, according to the age of the animals: a young hamster makes them scarcely a foot deep; an old one sinks them to the depth of four or five. The whole diameter of the habitation, with all its communications, is sometimes eight or 10 feet. The female breeds twice or three times a-year, and produces from six to 18 at a litter. The young grow very rapidly, and are soon able to shift for themselves. The male and female have always separate burrows; for, except in their short season of courtship, they have no intercourse. The whole race is so malevolent, as constantly to reject all society with one another. They will fight, kill, and devour each other. The female shows little affection even for her young; for if any person digs into the hole, she attempts to save herself by burrowing deeper into the earth, leaving them a prey to the intruder. They would willingly follow her, but she is deaf to their cries, and even shuts up against them the hole which she has made. They feed on grain and fruits, which they collect in large quantities in their granaries; and in some countries they do so much damage among the corn, that a considerable reward is offered for destroying them. According to Mr Sultzer, they abound to such a degree in Gotha, that in one year, 11,564, in another 54,429, and in a third, 80,136 of their skins were delivered in at the hotel de ville of that capital.

The life of a hamster (says Buffon) is divided between eating and fighting. He seems to have no other passion than that of rage, which induces him to attack every animal that comes in his way, without in the least attending to the superior strength of the enemy. Ignorant of the art of saving himself by flight, rather than yield, he will allow himself to be beaten to pieces with a stick. If he seizes a man's hand, he must be killed before he quits his hold. The magnitude of the horse terrifies him as little as the address of the dog, which last is fond of hunting him. When the hamster perceives a dog at a distance, he begins by emptying his cheek pouches, if they happen to be filled with grain. He then blows them up so prodigiously, that the size of the head and neck greatly exceeds that of the rest of the body. He raises himself on his hind legs, and thus darts upon the enemy. If he catches hold, he never quits it, but with the loss of life. But the dog generally seizes him behind, and strangles him. This ferocious disposition prevents the hamster from being at peace with any animal whatever. He even makes war against his own species, not excepting the females. When two hamsters meet, they never fail to attack each other, and the stronger always devours the weaker. A combat between a male and a female commonly lasts longer than between two males. They begin by pursuing and biting each other; then each of them retires to a side, as if to take breath; a little after they renew the combat, and continue to fly and to fight till one of them falls. The vanquished uniformly serves for a repast to the conqueror.

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121 Hydromys.

Genus 30. Hydromys (f).

Cutting teeth two in each jaw; canine; grinders two in each row, furrowed on the side, and having a double excavation on the crown. Feet five-toed; toes on the fore feet three; those on the hind webbed. Tail round and covered with short hair.

This is a new genus, constituted by Geoffroy to comprehend the coypou, which is commonly ranked as a species of *mus*, and two other species that had not been described.

His account of the genus is contained in the sixth volume of the *Annales de Museum National*, and a translation of his memoir is given in the 22d volume of the Philosophical Magazine.

The three species are thus distinguished by Geoffroy.

1. *H. Coypus*, Coypou H. Hair chesnut brown on the back, red on the flanks, and bright brown below the belly.—2. *H. Chrysogaster*, Yellow-bellied H. Hair chesnut brown above, orange below.—3. *H. Leucogaster*, White-bellied H. Hair brown above, white below.

122 *Coypus*, Coupou Rat. Fig. 55.

1. *H. Coypus*, Coypou, or Coypou Rat.—This curious animal was first described by Molina, who speaks of it as a species of water rat, of the size and colour of an otter. According to Geoffroy, it is a large animal, being about 14 inches from nose to tail, with a tail about two inches long. The general tint of the hair on the back is a chesnut brown. This colour becomes brighter on the flanks, and passes to bright red; under the belly it is only a dirty and almost dark russet. Yet this colour is sufficiently changeable according to the manner in which the coypou raises or lowers its hair. This mobility in the tone of its fur arises from each hair being of an ash-coloured brown at the root, and bright red at the point. The felt concealed under the

(f) Geoffroy chooses to spell this word *hydromis*; but we have thought the orthography that we adopt more conformable to the Greek origin of the name, viz. ὑδρομυς, or *water-rat*.

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the long hair is an ash brown, of a brighter tint under the belly. The long hair on the back has the points only reddish, and that on the flanks is of the latter colour throughout the half of its length.

As in all animals which go frequently into the water, the hair of the tail is thin, short, stiff, and of a dirty red colour: in its naked parts it is scaly. The contour of the mouth and extremity of the muzzle are white. The whiskers, which are long and stiff, are also white, some black hairs excepted. Among the great number of skins which form part of the collection of M. Beehem, M. Geoffroy saw some belonging to animals which had no doubt been afflicted with the albine disease; in one of these the silky hairs were entirely russet, so that the back appeared of the same tint as the sides and the belly; in another, the dorsal stripe, instead of being chesnut, had passed entirely to a red colour, the flanks being of a very pale red. He could not believe that these varieties on the one hand, were the character of youth or of the female, because these accidents were rare, considering the great number of skins which he examined; and, on the other, because M. d'Azzara has expressly told us that the female is entirely similar to the male.

Molina and d'Azzara agree in regard to the mild qualities by which the coypou is distinguished. It eats every thing given to it. It may be easily tamed, and soon becomes accustomed to the state of domesticity. It is never heard to cry but when harshly used; it then emits a piercing cry. The female produces five young, which she always carries with her.

The coypou is very common in the provinces of Chili, Buenos Ayres, and Tucuman. On the other hand, it is rarely found in Paraguay.

123 Arctomys.

Genus 31. Arctomys. *Marmots.*

Front teeth two in each jaw, strong, sharp, and wedged. Grinders in the upper jaw five on each side; in the lower jaw four. Clavieles or collar bones in the skeleton.

This genus differs in very few particulars from that of *mus*. The marmots are of a thick form, with large, roundish, and somewhat flattened heads, small mouths, the fissure having somewhat of a perpendicular appearance; ears very short, and sometimes none; a short villous tail, and five-toed hind feet: the skeleton is furnished with clavicles or collar-bones, and the cœcum or appendicular intestine is very large. They are diurnal animals; feed on roots and grain, reside in subterraneous holes or burrows, and sleep during the winter.

There are eight species, viz.

1. *A. Marmota*, Alpine M. Brown, reddish beneath.—2. *A. Monax*, Maryland M. Rusty brown, with bluish gray snout, and longish villous tail.—3. *A. Empetra*, Quebec M. Gray, waved with darker and lighter shades, reddish below, with dusky tail.—4. *A. Bobac*, Bobac. Gray, reddish below, with a thumb claw on the fore feet.—5. *A. Pruinosa*, Hoary M. Hoary, with black legs and tail.—6. *A. Maulina*, Mauline M. Tail of middling length; ears sharp-pointed, and feet five-toed.—7. *A. Gundi*, Gundi M. Reddish, with abruptly terminated ears.—8. *A. Citillus*, Variegated M. Earless, with villous tail.

1. *A. Marmota*, Alpine M.—This animal is rather larger than a rabbit, being about 16 inches long, exclusive of the tail, which measures about 6 inches. Its head is rather large and flattish; the ears short and hidden in the fur, and the tail thick and bushy.

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124 *Marmota*, Alpine Marmot. Fig. 56.

It is a native of the Alps and Pyrenees, being most frequently found in Savoy and Switzerland, where it inhabits the higher regions, and feeds on various roots, plants, insects, &c. It climbs readily, and ascends with ease the rocky eminences and fissures.

It is an animal which delights in the regions of high mountains. In such situations several individuals unite in forming a place of retreat, which is contrived with great art, and consists of an oval cavity or general receptacle, large enough to contain several of the animals, and having a large canal or passage, which divaricates in such a manner as to present two outlets to the surface of the ground. These recesses are prepared on the declivity of elevated spots; and the cavern or receptacle is well lined with moss and hay, which they prepare during summer, as if conscious of the necessity of providing for their long hybernal sleep. In fine weather they are seen sporting about the neighbourhood of their burrows, and delight in basking in the sunshine, frequently assuming an upright posture, sitting on their hind feet. When assembled in this manner, it is observed, that one of the exterior number seems to act as a sentinel; and on the approach of any danger, alarms the fraternity by a loud shrill whistle, on which they instantly retire to their cavern. These animals make no provision for winter; but as soon as the autumnal frosts commence, they carefully stop up the entrances to their mansions, and gradually fall into a state of torpidity, in which they continue till the arrival of spring, when they again awake, and recommence their excursions. Before they retire to their winter quarters they are observed to grow excessively fat; and, on the contrary, appear greatly emaciated on first emerging from them. If carefully dug up during the winter, from their holes, they may be conveyed away in their sleeping state; and when brought into a warm chamber, gradually awaken, nearly in the same manner as the hamster. If kept in a warm situation, they do not become torpid in winter. They breed early in summer, and the litter commonly consists of three or four, the growth of which is observed to be very rapid.

When taken young, the marmot may be easily tamed, and is often taught to perform various gesticulations. In a domestic state it will also eat almost any kind of animal or vegetable food, and is extremely fond of milk. In feeding it generally sits in an upright position, making use of its paws in the manner of a squirrel.

125 Sciurus.

Genus 32. Sciurus. *Squirrels.*

Upper front teeth wedged; lower sharp. Upper grinders five on each side, lower four. Clavicles. Tail in most species spreading towards each side.

The beautiful animals which compose this genus are remarkable for the liveliness of their disposition, the rapidity of their movements, and the general neatness and elegance of their appearance. A few of the species are furnished with an expansile lateral skin, similar to that in the galago, by means of which they are enabled to spring to a great distance, and to transport themselves occasionally from tree to tree. Like the galago, they can-

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not, however, continue this motion, and are therefore improperly called *flying squirrels*. The squirrels inhabit woods, and prepare their nests in hollow trees. They live entirely on vegetable food.

There are 26 species, viz.

A. *Not striped.*

1. *S. Maximus*, Great S. Rusty, yellowish below, with the outsides of the limbs and tail black.—2. *S. Madagascariensis*, Madagascar S. Black, with the nose, ears, and under parts yellowish white, and very long tapering tail.—3. *S. Macrourus*, Long-tailed S. Dark brown, yellowish white below, with the tail twice the length of the body.—4. *S. Bicolor*, Javan S. Blackish, fulvous below, with pointed beardless ears, and large rounded thumb claw.—5. *S. Anomalus*, Georgian S. Dusky rusty, with tail and lower parts fulvous, and rounded beardless ears.—6. *S. Erythræus*, Ruddy S. Yellowish brown, with the under parts and tail red rusty, and ciliated ears.—7. *S. Indicus*, Bombay S. Purple brown; yellow below; tip of the tail orange-coloured.—8. * *S. Vulgaris*, Common S. Reddish brown, white below, with pencilled ears.—9. *S. Cinereus*, Gray S. Ash-coloured, white below, with beardless ears.—10. *S. Niger*, Black S. Black, with beardless ears.—11. *S. Hudsonius*, Hudson's Bay S. Iron gray, dashed with rusty, whitish below, with dusky side-stripe, and lance-shaped tail edged with black.—12. *S. Persicus*, Persian S. Dusky, yellow below, with white sides, beardless ears, and blackish gray tail, with a white band.—13. *S. Flavus*, Fair S. Yellow, with roundish ears and five-toed feet.—14. *S. Æstuans*, Brasilian S. Dusky; yellow below, with longitudinal white stripe in the middle.

B. *Striped or variegated.*

15. *S. Variegatus*, Coquallin S. Rustyish, orange-tawney below, with the upper parts varied crosswise with black, brown, and whitish.—16. *S. Mexicanus*, Mexican S. Ash brown, with five or seven longitudinal white stripes.—17. *S. Getulus*, Barbary S. Brown, with four longitudinal white stripes.—18. *S. Palmarum*, Palm S. Brown, pale below, marked above with three longitudinal yellowish stripes, and the tail with blackish ones.—19. *S. Gingianus*, Gingi S. Gray brown, with a longitudinal white stripe on each side, and blackish tail.—20. *S. Degus*, Chilian S. Yellowish brown, with a black stripe on each shoulder.—21. *S. Striatus*, Striped S. Yellowish brown, with five longitudinal blackish stripes.

C. *Flying Squirrels.*

22. *S. Volans*, Common flying S. Pale gray, white below, with the side skin dilated into a flying membrane.—23. *S. Volucella*, Virginian flying S. Brown, yellowish white below, with a flying membrane.—24. *S. Sabrinus*, Severn flying S. Rusty brown, yellowish white below, with flattish villous tail.—25. *S. Sagitta?* Hooded flying S. Rusty brown, pale rusty below, with the flying membrane commencing on each side of the head.—26. *S. Petaurista*, Taguan S. Chesnut-coloured; pale rusty beneath, with very long, round, tapering, villous tail.

126 *Vulgaris*, Common Squirrel. Fig. 57.

8. *S. Vulgaris*, Common Squirrel.—The tail of this species is long enough to cover the whole body, and is covered with long hairs, disposed on each side horizontally, which gives it a great breadth. These serve a double purpose. When erected, they prove a secure protection from the injuries of heat or cold: When extended, they are very instrumental in promoting those vast leaps the squirrel takes from tree to tree. On the authority of Klein and Linnæus, we may add a third application of the form of the tail. These naturalists tell us, that when the squirrel is disposed to cross a river, a piece of bark is the boat, the tail the sail.

Glires.

This animal is remarkably neat, lively, active, and provident, never leaves its food to chance, but secures in some hollow tree a vast magazine of nuts for winter provision. In the summer it feeds on the buds and young shoots, and is particularly fond of those of the fir and pine, and also of the young cones. It makes its nest of moss or dry leaves, between the fork of two branches, and brings forth four or five young at a time. Squirrels are in heat early in the spring, when it is very diverting to see the female feigning an escape from the pursuit of two or three males, to observe the various proofs they give of their agility, which is then exerted in full force.

The colour of the whole head, body, tail, and legs of this animal, is a bright reddish brown: the belly and breast white. In some parts of Wales there is a variety of the squirrel kind, with a cream-coloured tail. The ears are very beautifully ornamented with long tufts of hair, of a deeper colour than those of the body. The eyes are large, black, and lively. The fore teeth strong, sharp, and well adapted to its food. The legs are short and muscular; the toes long and divided to their origin: the nails strong and sharp; in short, in all respects fitted for climbing, or clinging to the smallest boughs. On the fore feet it has only four toes, with a claw in the place of the thumb or interior toe: on the hind feet there are five toes. When it eats or dresses itself, it sits erect, covering the body with its tail, and making use of the fore legs as hands. It is observed that the gullet of this animal is very narrow, to prevent it from disgorging its food, in descending of trees, or in down leaps.

In northern climates these animals change their colour to gray on the approach of winter; and it is singular that this change will take place, even though they are kept in the warmth of a stove.

127 Myoxus.

Genus 33. Myoxus. *Dormice.*

Front teeth two; upper wedged, lower compressed. Grinders four in each jaw. Whiskers long. Tail cylindric, villous, thicker towards the end. Legs of equal length; fore feet four-toed.

There are seven species, viz.

1. *M. Glis*, Fat D. Gray, whitish below.—2. *M. Nitela*, Garden D. Rufous, grayish white below, with a black mark above the eyes and behind the ears.—3. *M. Dryas*, Wood D. Grayish rufous, whitish below, with a straight black stripe across the eyes to the ears.—4. * *M. Muscardinus*, Common D. Rufous, with whitish throat, and the thumbs of the hind feet without claws.—5. *M. Chrysurus*, Gilt-tailed D. Purplish brown, with the hind part of the tail and longitudinal stripe on the head gold yellow.—6. *M. Guerlingus*, Guerlinguet D. Rusty, yellowish rufous beneath, with

Glires.

with long rather depressed tapering tail.—7. *M. Africanus*, African D. Rusty gray, whitish below, with a white superciliary and lateral line; tail black in the middle, and claws on the fore feet very long.

128 *Muscardinus*, Common Dormouse. Fig. 58.

4. *M. Muscardinus*, Common D.—The size of the dormouse is equal to that of a mouse, but has a plumper appearance, and the nose is blunter; the eyes are large, black, and prominent; the ears broad, rounded, thin, and semitransparent. The fore feet are furnished with four toes, the hind feet with five; but the interior toes of the hind feet are destitute of nails. The tail is about two inches and a half long, covered on every side with hair; the head, back, sides, belly, and tail, are of a tawney red colour; the throat white.

These animals seldom appear far from their retreats, or in any open place, for which reason they seem less common in England than they really are. They make their nests of grass, moss, and dead leaves, and usually bring forth three or four young at a time.

This animal agrees with the squirrel with respect to its food, residence, and in many of its actions; but it wants much of the sprightliness of that animal, never aspiring to the tops of trees, nor, like it, attempting to bound from spray to spray. Like the squirrel, it forms little magazines of nuts for winter provisions, takes its food in the same manner, and same upright posture. The consumption during the rigour of the season is but small, for it sleeps most part of the time, retiring into its hole at the first approach of the winter, where it lies torpid for the greatest part of that gloomy season. In that space it sometimes experiences a short revival, in a warm sunny day, when it takes a little food, and then relapses into its former state.

Genus 34. Dipus. *Jerboa.*

129 Dipus.

Front teeth two both above and below. Fore legs very short; hind legs very long. Clavicles.

There are six species, viz.

1. *D. Sagitta*, Common Jerboa.—Pale brown, white beneath, with extremely long three-toed hind feet, and very long tail, with subpinnated black and white tip.—2. *D. Jaculus*, Alagtaga J. Pale brown; white below, with extremely long five-toed hind feet, and very long tail, with subpinnated black and white tip.—3. *D. Cafer*, Cape J. Rusty, pale ash-coloured below, with five-toed fore feet, four-toed hind feet, and very villous tail, tipped with black.—4. *D. Meridianus*, Torrid J. Yellowish brown, white below, with about four toes on the fore feet and five-toed hind feet, and tapering tail.—5. *D. Tamaricinus*, Tamarisk J. Yellowish brown; white below, with about four toes on the fore feet, five-toed hind feet, and tapering tail obscurely ringed with brown.—6. *D. Canadensis*, Canadian J. Yellowish brown, whitish below, with four-toed fore feet, five-toed hind feet, the tail long and mouse-like.

130 *Sagitta*, Common Jerboa Fig. 59.

1. *D. Sagitta*, Common J.—This animal appears to have been known to the ancients, under the name of μυς διπους, or two-footed mouse, and is represented, though not very correctly, on some coins of Cyrene, where it is found in great abundance. By some it is supposed to be the *saphan* of the sacred writings (in our translation rendered *coney*), though this is denied by Mr Bruce. It is found in Egypt, Barbary, Palestine, in the deserts between Bassora and Aleppo; the sandy tracts between the Don and Volga, and some other parts of Asia. M. Sonnini has given a long account of it, as he found it in Egypt, and from this we shall extract the following description. History of the Species.

"Its size is nearly equal to that of a large rat. Its head is broad, large in proportion to the body, the upper part flat, and of a light fawn colour, striped with black; the upper jaw projects beyond the lower: they are both provided with two cutting teeth; the upper ones broad, square, flat, and divided lengthwise by a groove in the middle: the lower ones longer, convex externally, pointed at the extremity, and bent inwards. The muzzle is short, wide, and obtuse; a number of stiff hairs grow out on each side, and form long whiskers. The nose is white, bare, and cartilaginous. The iris of its large and projecting eye is brown; the ears long, large, and covered with hair, so short that they appear naked except on very close inspection; externally they are white in the lower part, and gray upwards: their middle, as well as the sides of the head, is of a very light fawn colour, mixed with gray and black: they entirely surround the meatus auditorius for about one-third of their length, so that they exactly resemble the larger end of a cone. This conformation must increase the animal's faculty of hearing, and is particularly well calculated to defend the inner part of the organ from the extraneous substances that might lodge there. The body is short, well provided with long, soft, silky hair; that which covers the back and sides is of an ash colour throughout almost the whole of its length, and of a light fawn colour where it approaches the points, which are black; but as the ash-coloured part is not visible, it may be said that the fur is fawn-coloured, with blackish zigzag stripes. These tints, which are somewhat dusky, form an agreeable contrast with the fine white of the belly. The fore legs are so short that they scarcely extend beyond the hair: they are white, and have five toes, the inner of which is short, rounded at the end, and has no nail. The four other toes, the second outer one of which is the longest, are long, and armed with great hooked nails; the heel is very high, and the middle of the foot is naked and of a flesh colour. These fore feet are of no use to the animal in walking, but serve him only to lay hold of his food, and to carry it to his mouth, as also to dig his subterraneous abode. The hind legs are covered with long hair, fawn-coloured and white; its long feet are almost entirely bare, especially on the outside, which must necessarily be the case, since the animal, whether in motion or at rest, constantly leans on that part. Those feet, so exceedingly long, have each three toes; the middle one something longer than the other two; they are all provided with nails, which are short, but broad and obtuse; they have also at the heel a kind of spur, or rather a very small rudiment of a fourth toe, which gives the jerboa of Egypt some resemblance to the alagtaga of Tartary, described by Gmelin in the Petersburgh Transactions, and which part probably escaped Hasselquist, as well as many others. The toes and the heel are furnished below with long gray hairs tinged with yellow, except that at the origin of the toes, which is of a blackish cast; the nails, both of the fore and hind feet, are of a dirty white. According to Hasselquist the tail of the jerboa is three times the

History of the Species.

the length of the body. I never, says Sonnini, found it much more than half that length. It scarcely exceeds the circumference of a goose quill, but is of a quadrangular and not a round shape. It is of a deeper gray above than below, and is furnished with short hairs as far as the extremity, which ends in a tuft of long silky hair, half black and half gray *."

* *Sonnini's Travels in Egypt.*

This animal is as singular in its motions as in its form. It always stands erect on its hind feet, the fore feet performing the office of hands. It runs fast, and, when pursued, jumps five or six feet from the ground; burrows like rabbits; keeps close in the day; sleeps rolled up; is lively during night; when taken, emits a plaintive feeble note; feeds on vegetables, and has great strength in its fore feet. Two which Mr Pennant saw living in London, burrowed almost through the brick wall of the room they were in, came out of their hole at night for food, and, when caught, were much fatter and sleeker than when confined to their box.

The jerboa is easily tamed. M. Sonnini kept six of them for some time in a large iron cage, but found it was very difficult to preserve them, owing to their great tenderness.

131 Lepus.

Genus 35. LEPUS. *HARES and RABBITS.*

Front teeth two in each jaw, the upper pair duplicate; two small inner teeth standing behind the outer.

This genus approaches very nearly to the order of Pecora, and it has even been supposed that the common hare actually ruminates; an opinion which is owing not merely to the peculiar motions of its mouth, similar to those in ruminating animals, but to the structure of the stomach, which appears to be divided into two regions by a particular fold. All the species are herbivorous.

There 12 species, viz.

1. * *L. Timidus*, Common H. Rusty-ish brown, short-tailed, with ears longer than the head and tipped with black.—2. * *L. Variabilis*, Varying H. Tawney-gray, short-tailed, (white in winter) with ears shorter than the head, and tipped with black.—3. *L. Americanus*, American H. Tawney-gray, short-tailed, white below, with the hind legs longer than the body, and the ears and tail tipped with gray.—4. *L. Tolai*, Baikal H. Pale brown, short-tailed, with the upper edges of the ears black.—5. * *L. Cuniculus*, Rabbit. Short-tailed, brown, with the tips of the ears black, and the hind legs shorter than the body.—6. *L. Brasiliensis*, Brazilian H. Tailless, brown, white below, with a white collar round the neck.—7. *L. Capensis*, Cape H. Brown, with reddish legs, and tail the length of the head.—8. *L. Visaccia*, Visaccia. Brownish, with long bristly tail.—9. *L. Alpinus*, Alpine H. Tailless, rusty, with rounded ears and brownish feet.—10. *L. Ogotana*, Ogotana H. Tailless, pale brown, with oval sharpish ears of the same colour.—11. *L. Pusillus*, Calling H. Tailless, gray-brown, with nearly triangular ears edged with white.—12. *L. Minimus*, Minute H. Short-tailed, brown, long-nosed, with small hairy pointed ears.

132 *Timidus*, Common Hare. Fig. 60.

1. *L. Timidus*, Common H.—To describe an animal so well known would be superfluous; we may only remark, that nature, ever kind and provident, in pity to its defenceless state against its numerous enemies, has bestowed on it many faculties, by which it is frequently enabled to evade their pursuit. Fearful of every danger, and attentive to every alarm, the hare is continually upon the watch, and being provided with very long ears, moveable at pleasure, and easily directed to every quarter, is warned of the most distant approaches of danger. Its eyes are large and prominent, adapted to receive the rays of light on every side, and give notice of more immediate alarms. To these may be added its great swiftness, by which it soon leaves most of its pursuers far behind.—The hind are much longer than the fore legs, and are furnished with strong muscles, which give the hare a singular advantage in running up a hill; and, as if sensible of its powers in this respect, it is always observed to fly towards rising ground when first started. Glires.

Thus formed for escape, the hare might be supposed to enjoy a state of tolerable security; but as every rapacious creature is its enemy, it is seldom permitted to live out its natural term. Dogs and foxes pursue it by instinct; wild cats and weasels of all kinds, catch and devour it; birds of prey are still more dangerous enemies, whilst man, far more powerful than all, makes use of every artifice to obtain an animal which constitutes one of the numerous delicacies of his table. If we were to enumerate the various stratagems which ingenuity has suggested to circumvent this persecuted creature, we would willingly omit the notable atchievements and gallant exploits of the chase, which to a cool and dispassionate observer, seem to demand a nobler game. This animal has also another means of safety from her colour very much resembling that of the ground where she sits. In the colder regions she is said to become white during the winter, when the ground is covered with snow.

The hare is very prolific, breeds four or five times in the year, goes with young 30 days, and generally produces three or four at a litter. They are first in heat about February. Hares generally keep within their seats during the day, going out only at night in search of food, and they always return to their forms by the same paths by which they left them.

The following instances of the sagacity of the hare, in endeavouring to escape from its enemies, are quoted by Mr Bewick. Touilloux says, he has seen a hare start from its form at the sound of the hunter's horn, run towards a pool of water at a considerable distance, plunge itself in, and swim to some rushes in the middle, where it lay down, and concealed itself from the pursuit of the dogs. He mentions another, which, after running two hours before the dogs, pushed a hare from its seat, and took possession of it. Others he has seen run into a sheepfold, and lie down among the sheep; and some have effected their escape by mounting an old wall, and clapping themselves down in the midst of the ivy which covered it.

The hare has been sometimes tamed, and rendered very familiar. When Dr Townson was at Gottingen, he had a young hare that became so frolicsome in the evenings, as to run about upon the sofa and bed, sit upon its hind legs, and pat him with its fore feet; and while he was reading, it would even knock the book out of his hand. Mr Borlase saw a hare that was so familiar as to feed from the hand, lay under a chair in a common sitting room, and appeared, in every other respect,

Glires.

spect, as easy and comfortable in its situation as a lap-dog. It now and then went out into the garden; but after regaling itself, always returned to the house as its proper habitation. Its usual companions were a grey-hound and a spaniel, both so fond of hare-hunting, that they often went out together without any person accompanying them. With these two dogs this tame hare spent its evenings; they always slept on the same hearth, and very frequently it would rest itself upon them.

The fur of the hare is used for hats; and for this purpose many thousands of their skins are imported into this country from Russia, besides what are collected here.

133 *Cuniculus*, Rabbit.

5. *L. Cuniculus*, the Rabbit.—Respecting an animal so well known as the rabbit, we shall remark only, that its fecundity is truly astonishing. It breeds seven times in the year, and generally produces eight young at a time. Hence it is calculated, that the produce of a single pair may, in the course of four years, amount to the amazing number of 1,274,840, so that if frequent reductions were not made by various ways, there is reason to apprehend that they would soon exceed the means of their support, and overrun the face of the country. They are, however, exposed to numerous enemies. Besides the havock made among them by man for their flesh and skins, which latter are also used in the manufacture of hats, they are the prey of foxes, weasels, polecats, and other beasts of prey.

The rabbit is often kept in a domestic state; but the flesh of the domestic rabbit is far inferior to that of the wild animal.

135 Hyrax.

Genus 36. HYRAX. *HYRAX, or DAMAN.*

Front teeth in the upper jaw two, broad, and rather distant; in the lower four, broad, flat, twice notched. Grinders four on each side in both jaws, large. Fore feet four-toed; hind feet three-toed. No tail or clavicles.

There are three species, viz.

1. *H. Capensis*, Cape H. Gray brown, paler below, with flat nails on the fore feet, and a single sharp crooked claw on the hind feet.—2. *H. Syriacus*, Syrian H. Reddish gray, white below, with three-toed feet, and nearly equal claws.—3. *H. Hudsonius*, Hudson's bay H. Ash brown, with the hair whitish at the tips, and all the feet four-toed.

A long account is given of the second species in Mr Bruce's Travels to Abyssinia. Mr Bruce calls it *askoko*, and supposes it to be the saphan or coney of the sacred writings. For his description we must refer to the work itself.

This order contains 11 genera and 124 species.

CHAP. V. PECORA.

History of the Species.

135 Camelus.

Genus 37. CAMELUS, *CAMELS.*

Horns wanting. Front teeth in the lower jaw six; rather thin and broad. Canine teeth distant, three in the upper jaw, two in the lower. Upper lip divided.

There are usually enumerated seven species, viz.

1. *C. Dromedarius*, Arabian C. With a single bunch on the back.—2. *C. Bactrianus*, Bactrian C. With two bunches on the back.—3. *C. Glama*, Glama. Pale rusty, whitish below, with level back and pectoral bunch.—4. *C. Vicugna*, Vicuna. Purplish brown, whitish below, with level woolly back, blunt snout, and upright tail.—5. *C. Paco*, Paco. Purplish brown, woolly, white below, with oblong snout.—6. *C. Huanacus*, Guanaco. Tawney, white below, with gibbous back, and upright tail.—7. *C. Arcuranus*, Chilihuque. With smooth woolly body, curved snout, and pendulous ears and tail.

136 Dromedary, or Arabian Camel. Fig. 62.

1. *C. Dromedarius*, Arabian Camel. Dromedary. A single bunch on the back.—This species is thus described by Dr Shaw.

The general height of the Arabian camel, measured from the top of the dorsal bunch to the ground, is about six feet and a half; but from the top of the head, when the animal elevates it, not less than nine feet. The head, however, is generally so carried as to be nearly on a level with the bunch, or rather below it, the animal bending the neck extremely in its general posture. The head is small; the neck very long; the body of a long and meagre shape; the legs rather slender, and the tail, which is slightly tufted at the end, reaches to the joint of the hind legs. The feet are very large, and are hoofed in a peculiar style, being divided into two lobes not reaching through the whole length of the foot; and the extremity of each lobe is guarded by a small hoof. The under part of the foot is covered with an extremely strong, tough, and pliable skin, which, by yielding in all directions, enables the animal to travel with peculiar ease and security, over dry, stony, and sandy regions. On each leg are six callosities, viz. one on each knee, one on the inside of each fore leg on the upper joint, and one on the inside of each hind leg at the bottom of the thigh. On the lower part of the breast is also a large callus or tough tubercle (G).

The camel is generally of a dusky-brown colour, with a rusty tinge.

Its hair is very fine and soft, and is employed in making pencils for painters, and in the manufacture of various stuffs.

This

(G) It was formerly supposed that, besides the four stomachs common to all ruminating animals, the camel had a sort of fifth stomach or appendage to the second stomach, calculated for receiving a large quantity of water to supply the animal in his long journeys over the deserts. There is no such receptacle: but in the first, and more especially the second stomach, there are several rows of cells, furnished round their edges with strong muscular fibres, by which they can be closed at pleasure. Into these cells part of the water which the camel drinks, is, by a peculiar mechanism, received, and retained, in a pure state, till the animal has occasion for it. In an interesting paper on this subject in the Philosophical Transactions for 1806, Mr Home has given a comparative view of the structure of the stomachs in the ox and the camel, illustrated by plates.

History of the Species.

This animal attains its full strength at about the age of six years, and lives about 40 years, or sometimes 50. Only the males are usually employed for labour; the females being kept for breeding, and suffered to range at liberty. These go with young about 12 months, and usually bring forth one at a time.

The camel is found wild in the deserts of Arabia, in Africa, and in most of the temperate parts of Asia. It is domesticated chiefly among the Arabs, of whom it forms the principal riches.

We are chiefly acquainted with this animal in a state of domestication; and to this state only the accounts that have been given of him are applicable. A few days after birth the legs of the young camels are folded up below their belly, and they are constrained to remain in this position on the ground, and are loaded with a pretty heavy weight, which is never taken off but to replace it by a greater. Instead of allowing them to feed and drink at pleasure, they begin by regulating their repasts, and increasing the intervals between them, and diminishing the quantity of their nourishment. When they have acquired a little more strength they are exercised in running, in which they are excited to emulation by the example of horses; and thus in time they become both robust and active.

Thus instructed, the camels traverse with great rapidity the immense deserts of Arabia, marching night and day almost without stopping, and almost without taking food or drink. They are often made with apparent ease to travel 300 leagues in eight days; and during the whole of this time they are allowed but one hour of the day for repose, and for nourishment: often they will run for even nine or ten days without finding water; but when they happen to find water at some distance in their route, if permitted, they eagerly make towards it, and are said to scent it at more than half a league's distance.

The march of camels across the sandy plains of Arabia has been elegantly described by Buffon. "Figure to yourself (says this animated writer) a country without verdure and without water, a burning sun, an air always parched, sandy plains, mountains still more adust, which the eye runs over without perceiving an animated being; a dead earth perpetually tossed with the wind, and presenting nothing but bones, scattered flints, rocks perpendicular or overturned; a desert totally void, where the traveller never breathes under a shade, where nothing accompanies him, nothing reveals the idea of animated nature; absolute solitude, more dreadful than that of the deepest forests: more solitary and naked, more lost in an unlimited wild, he every where beholds space surrounding him like a tomb; the light of day, more dismal than the darkness of night, serves only to give him a clear idea of his own wretchedness and impotence, and to conceal from his view the boundaries of the void, by extending around him that immense abyss, which separates him from the habitable parts of the earth.

"The Arab, however, by the assistance of his camel, has learned to surmount, and even to appropriate these frightful intervals of nature. They serve him for an asylum, they secure his repose, and maintain his independence; but man never uses any thing without abuse. This same free, independent, tranquil, and even rich Arab, instead of regarding his deserts as the ramparts of his liberty, pollutes them with his crimes; he traverses them to carry off goods and slaves from the adjacent nations; he employs them for perpetrating his robberies, which unluckily he enjoys more than his liberty, for his enterprises are almost always successful; notwithstanding the vigilance of his neighbours and the superiority of their strength, he carries off with impunity all that he ravishes from them. An Arab who gives himself up to this kind of land piracy, is early accustomed to the fatigues of travelling, to want of sleep, and to hunger, thirst, and heat, and with the same view he uses and instructs his camels. After he is certain of the strength, fleetness, and sobriety of his camels, he loads them both with his own and their food, sets off with them, arrives unperceived at the confines of the desert, robs the first passenger he meets, pillages the solitary houses, loads his camels with the booty; and, if pursued, he is obliged to accelerate his retreat. It is on these occasions, that he unfolds his own talents and those of the camels; he mounts one of the fleetest, and conducts the troop, and makes them travel night and day, without almost either stopping, eating, or drinking; and in this manner he easily performs a journey of 300 leagues in eight days. During this period of motion and fatigue his camels are perpetually loaded."

Pecora.

In Turkey, Persia, Arabia, Egypt, and Barbary, the only means of transporting merchandise is by camels, as this is of all others the cheapest and most expeditious method. The merchants and other travellers unite in a caravan, in order to avoid the insults, piracies, and robberies of the Arabs. These caravans always consist of a greater number of camels than of men; each of these animals is loaded according to his strength, and he so well knows the proper extent of his load, that when he is overloaded, he utters the most lamentable cries, and continues lying down till his burden is lightened. The large camels usually carry 10 or even 12 hundred weight, and the smaller 6 or 7 hundred weight.

In these commercial journeys they never hurry the camels in their march, but regulate their days work; they generally go a certain space, and travel about 10 or 12 leagues every day; every evening their load is taken off, and they are suffered to feed at liberty. If they are in a country abounding with herbage, they usually eat as much in an hour as is sufficient to serve them for the next twenty-four hours; and, during the remainder of the night, they continue to ruminate: but they seldom find such good pasturage; and indeed this delicate nourishment does not appear to be necessary for them; they even seem to prefer wormwood, thistles, nettles, broom, cassia, and other prickly plants, to more pleasant herbage. So long as they find plants to browse, they easily go without drink.

Nothing is more admirable than their docility. At the first sign they bow their knees, and crouch to the earth to suffer themselves to be loaded in this situation, and, when loaded, they rise of their own accord without assistance. They follow exactly the motions of their conductor, and require neither whip nor spur to urge them forward; but, when they begin to be fatigued, their masters support their spirit, or rather beguile their fatigue, by singing or by the sound of musical instruments. When they wish to prolong their journey, they give them

Pecora.

them only an hour for repose; and then resuming their song, they continue the march for several hours longer, and give over singing only when they intend to stop; then the camels crouch again with their burdens, from which they are freed by loosening the cords and fastenings on each side, while the poor animals remain kneeling on the earth, and sleep in this posture in the midst of their baggage. Mr Pennant and some other writers tell us, that camels are made to go more expeditiously by being whistled to by the drivers; but this is at least not an universal practice, as we are told by Sonnini, that the Bedouin Arabs, who possess great numbers of camels, not only never use whistling themselves, but express much uneasiness when they hear others whistle.

When the caravan on these long journeys across the deserts find themselves in want of water, and have no other means of procuring it, it is not uncommon for them to kill a camel for the sake of the water contained in his stomach, which is said to be always sweet and pleasant.

This animal, so patient, and so obedient to the voice of man, has, however, his periodical fits of rage, at which he becomes wholly unmanageable. These fits take place at the rutting season, which happens every year about spring, and continues about 40 days. At these times they are quite outrageous, eat little, foam at the mouth, and bite at other animals, and even their masters; and they have been known to take up a man in their teeth, throw him on the ground, and trample him under their feet. Though so remarkably docile, except during the rutting season, they are, however, abundantly sensible of injustice and ill treatment: and, when they experience these, they seldom fail to shew their resentment, and endeavour to wreak their vengeance on their unfeeling driver, who will not find it easy to escape their vengeance, as they are said to retain for a long time the remembrance of an injury. Though eager to express their resentment, they seem incapable of harbouring any rancour, when they are once satisfied; and it is sufficient to make them believe that they have taken their desired vengeance on their persecutor. Whenever the Arab finds that he has excited the rage of his camel, as he well knows that the animal will take the first opportunity of seeking revenge, he lays down his clothes in a situation which the animal is to pass, and arranges them in such a manner as to seem as if he himself were lying there. The camel recognises the clothes, seizes them in his teeth, shakes them violently, and tramples them under his feet; but when his rage has been thus satisfied, he leaves them, and after this his owner may approach, load, and guide him as usual. M. Sonnini says, that he has sometimes seen them, when weary with the impatience of their riders, stop short, turn round their long necks to bite them, and utter cries of rage. Under these circumstances the rider must be careful not to dismount, or he would infallibly be torn in pieces; and he must also beware of striking the beast, as that would only increase his fury. Nothing can be done but to wait with patience, and endeavour to appease the animal by patting him with the hand. When once appeased, which sometimes is not speedily effected, he can proceed on his journey at his usual pace.

Genus 38. Moschus, *Musk*.

History of the Species.

Horns wanting; front teeth eight in the lower jaw; tusks solitary in the upper jaw, exserted.

137 Moschus.

There are 7 species, viz. 1. *Moschus Moschiferus*, Tibetian Musk. Gray-brown, with umbilical follicle. —2. *M. Indicus*, Indian M. Rufous, whitish below, with spurious hoofs, and somewhat lengthened tail.—3. *M. Pygmæus*, Pygmy M. Reddish-brown, white below, without false hoofs.—4. *M. Meminna*, Meminua. Olive ash, white below, with the sides spotted with white, and no false hoofs.—5. *M. Javanicus*, Java M. Rusty, longitudinally white beneath, with villous tail, white below and at the tip, and small appendicular hoofs. —6. *M. Americanus*, American M. Rufous brown, with black muzzle and white throat.—7. *M. Delicatulus*, Leverian M. Rusty brown, spotted above with white.

138 *Moschiferus*, Tibetian Musk. Fig. 65.

Species 1. *Moschus Moschiferus*, Tibetian Musk.—This is an animal of considerable importance, as it is from it that the article musk, so useful as a medicine and perfume, is derived.

The size and general appearance of this animal not ill resemble those of a small roebuck. It measures about three feet three inches in length, about two feet three inches in height from the tip of the shoulders to the bottom of the fore feet, and two feet nine inches from the top of the haunches to the bottom of the hind feet. The upper jaw is considerably longer than the lower, and is furnished on each side with a curved tusk about two inches long, and consequently exposed to view when the mouth is closed. These tusks are of a different form from those of any other quadruped, being sharp-edged on their inner or lower side, so as to resemble in some degree, a pair of small crooked knives; their substance is a kind of ivory, as in the tusks of the babyrussa and some other animals. The ears are long and narrow, of a pale yellow on the inside, and deep brown on the outside; the chin is of a yellowish cast; the general colour of the whole body a kind of deep iron-gray, the tips of the hairs being of a rusty cast, the remainder blackish, growing much paler or whitish towards the roots. Each hair is somewhat waved throughout its whole length; and is of a strong elastic nature, growing somewhat upright on the animal, and very thick. In some specimens the cheeks are whitish, and the sides of the neck marked by a longitudinal whitish band, descending to the breast, while the flank and sides are obscurely striped by a few waved whitish streaks; in others the colour is uniform, or as at first described; the hoofs are long and black, the tail extremely short, and so concealed by the fur as to be scarcely, if at all, visible on a general view.

The female is smaller than the male, and wants the tusks; it has also two small teats.

The musk animal is principally found in the kingdom of Tibet, in the province of Mohang Meng, Tonquin, and Boutan; and it is also found about the lake Baikal, and near the rivers Jenisea and Argun. Its favourite haunts are the tops of mountains covered with pines, where it delights to wander in places of the most difficult access, bounding with great celerity, and, when pursued, taking refuge among the most inaccessible summits.

History of the Species.

It is hunted for the sake of the musk contained in its umbilical follicle, which is an oval receptacle, peculiar to the male, about the size of a small egg, hanging from the middle of the belly. As soon as the animal is killed, the hunters cut off the bag and tie it up for sale. Tavernier informs us, that in one of his eastern journeys, he purchased no fewer than 7673 of these bags; a proof how numerous these animals must be in the east. For the appearance and uses of musk, with the method of detecting its adulteration, see MUSK, MATERIA MEDICA *Index*. Besides the musk that they produce, the skins of these animals are useful as clothing. The Russians scrape off the hair, and prepare the leather, so as to render it as soft and bright as silk.

139 Cervus.

Gen. 39. CERVUS. *DEER.*

Horns solid, covered while young with a hairy skin, growing from the top, naked, annual, branched. Front teeth in the lower jaw eight. Canine teeth none (sometimes single in the upper jaw).

There are 12 species, viz.—1. *C. Alces*, Elk. With stemless palmated horns, and guttural caruncle.—2. *C. Tarandus*, Rein D. Branched, recurvate, round horns, with palmated extremities.—3. * *C. Elaphus*, Stag. Reddish brown, with cylindric, recurvate, branching horns.—4. * *C. Dama*, Fallow D. Yellowish brown, with slightly recurvate, compressed, branching horns, palmated at the top.—5. *C. Virginianus*, Virginian D. Pale brown, with slender round branched horns, bending forward, and slightly palmated at the tip.—6. *C. Axis*, Spotted Axis. Pale reddish brown, spotted with white, with slender three-forked horns.—7. *C. Pygargus*, Tailless Roe. Tailless, brown, yellowish below, white behind, with three-forked horns and nose surrounded with black.—8. *C. Mexicanus*, Mexican Roe. Red, with rough three-forked horns, bending forward.—9. *C. Porcinus*, Porcine D. Brown, ash-coloured below, with slender three-forked horns.—10. * *C. Capreolus*, Common Roe. Reddish brown, with branching, upright cylindric horns, bifid at the top.—11. *C. Muntjac*, Rib-faced D. With three-forked horns rising from a cylindric hairy base, with the upper fork hooked.—12. *C. Guinensis*, Gray D. Gray, blackish below.

140 *Alces*, Elk. Fig. 64.

1. *C. Alces*, Elk, or Moose Deer.—In conformity with the opinion of most naturalists, we have given the two English names of Elk and Moose Deer as synonymous, though it is not yet clearly ascertained whether they are not really distinct species. The elk is by far the largest of the deer tribe, and if we may believe the accounts of some travellers, a full grown moose is many times bigger than an ox, the tips of its horns being sometimes nearly 12 feet asunder. Its shape is represented as very inelegant, having a short thick neck, large head, horns spreading out immediately from the base into a broad palmated form; a thick, broad, heavy upper lip, hanging considerably over the lower; high shoulders and long legs. Its colour is a dark grayish brown, much paler, or inclining to whiteness, on the legs, and beneath the tail. The hair, which is of a strong, coarse, and elastic nature, is much longer on the top of the shoulders and on the ridge of the neck than on the other parts, forming a kind of stiffish mane; beneath the neck the hair is also of considerable length, and in some specimens of the animal, a sort of caruncle or pendent excrescence, covered with long hair, is seen hanging from beneath the throat; the eyes and ears are large, the hoofs broad, and the tail extremely short. It is usually bigger than a horse, and Mr Pennant estimates its greatest height at 17 hands, and its greatest weight at 1230 pounds. Its horns sometimes weigh 56 pounds; and on a moderate calculation, measure each about 32 inches in length. The female is smaller than the male, and is destitute of horns. Pecora.

This animal inhabits both the Old and New Continent; but it is commonly called elk on the former, and moose deer on the latter. In Europe it is found chiefly in Sweden, Norway, and in some parts of Russia; in Asia it is met with most frequently in Siberia, where it is of a prodigious size; and in America it is most common in Canada, especially about the great lakes. It usually resides in the midst of forests, where it lives by browsing on the branches of the trees, as from its long legs and short neck it cannot easily graze from the ground. It feeds chiefly by night. Its usual pace is a high, shambling, but very swift trot, the feet being lifted very high; and, according to most writers, the hoofs during its running separate as they approach the ground in order to give the animal a better purchase, and come together again when they rise, producing a clattering noise that is heard at a considerable distance.

Its faculty of hearing is supposed to be more acute than either its sight or scent, which renders it very difficult to kill it in the summer time, as the Indians have then no other method of doing it but by creeping after it among the trees and bushes, till they get within gunshot. In winter, when the snow is so hard frozen that the natives can go upon it in their snow shoes, they are able frequently to run it down; for its slender legs break through the snow at every step, and plunge them up to the belly. It is so tender-footed, and so short-winded, that a good runner will generally tire it in less than a day; there have been some, however, that have kept the hunters in chase for two days. On these occasions the Indians, in general, take with them nothing more than a knife or bayonet, and a little bag containing implements for lighting a fire. When the poor animal is incapable of further speed, it stands, and keeps its pursuers at bay with its head and fore feet, in the use of the latter of which it is so dexterous, that the Indians are generally obliged to lash their knives or bayonets to the end of a long stick, and stab the elk at a distance. Some who have neglected this necessary precaution, and rashly attempted to rush in upon it, have received very serious blows from its fore feet. When wounded, it sometimes becomes furious, rushes boldly on the hunters, and endeavours to tread them down: in this case the men are frequently compelled to leave their outer garments, and escape into the trees.

When suddenly roused, and endeavouring to make its escape, the elk is observed at times to fall down, as if deprived for some moments of motion. Whether this be owing, as has been frequently imagined, to an epileptic fit, or whether it merely arises from fear, is not perhaps easy to determine. The fact, however, is too well authenticated to admit of our doubting it. This has given rise to the popular superstition of attributing to the hoofs the virtue of an antiepileptic medicine; and the Indians even still imagine that the elk has the power of curing itself of its own disorder, or of preventing an approaching

History of the Species.

approaching fit, by scratching its ear with the hoof till it draws blood.

The female produces from one to three young at a time, generally about the end of April or beginning of May.

The elk is an animal of great utility. Its flesh is eaten, and is reckoned very good, but coarser and tougher than any other kind of venison; its tongue is excellent, and the fat of its nose is so much like marrow, as to be esteemed a great delicacy; its skin makes excellent tent covers and shoe leather, and the hair of its hams, which is of great length, is employed in stuffing saddles.

141 *Tarandus*, Rein Deer.

2. *C. Tarandus*, Rein Deer.—This, in a domestic point of view, is the most useful animal to the natives of the countries where it resides, serving there most of the purposes of our horses. The height of this species, when full grown, is about four feet and a half. The body is rather of a thick and square form, and the legs shorter in proportion than those of the stag. Its general colour is brown above, and white below; but as it advances in age, it often becomes of a grayish white, and sometimes almost entirely white; the space about the eyes is always black. The hair on the under part of the neck is of much greater length than the rest, and forms a kind of hanging beard in that part. Both sexes are furnished with horns, but those of the male are much larger and longer than those of the female. The hoofs are long, large, and black, as are also the false or secondary hoofs behind; and these latter, while the animal is running, as was remarked of the elk, make a remarkable clattering sound, which may be heard at a considerable distance.

The female begins to breed at the age of two years, is in season the latter end of September, goes with young eight months, and generally brings forth two at a time. The fondness of the dam for her young is very remarkable. They follow her for two or three years, but do not acquire their full strength until four. It is at this age that they are trained to labour, and they continue serviceable four or five years. They seldom live above 15 or 16 years.

The rein deer is found in all the northern regions of Europe, Asia, and America, particularly in Lapland, Siberia, and Greenland, where it is employed to draw the sledges of the inhabitants over the frozen snow. To this exercise the animals are accustomed from an early age. They are yoked to the sledge by a collar, from which a trace is brought under the belly between the legs, and fastened to the fore part of the sledge. These carriages are extremely light, and covered at the bottom with the skin of the rein deer. The person who sits in it guides the animal with a cord fastened to its horns; he drives it with a goad, and encourages it with his voice. Those of the wild breed, though by far the strongest, often prove refractory, and not only refuse to obey their master, but turn against him, and strike so furiously with their feet, that his only resource is to cover himself with his sledge, upon which the enraged creature vents his fury. The tame deer, on the contrary, is pliant, active, and willing. When hard pushed, the rein deer will trot the distance of 60 miles without stopping; but in such exertions, the poor obedient creature fatigues itself so exceedingly, that its master is obliged to kill it immediately, to prevent a lingering death that would ensue. In general, they go about 30 miles without stopping, and that without any dangerous effort. This mode of travelling can be performed only in the winter season, when the face of the country is covered with snow; and although the conveyance is speedy, it is inconvenient, dangerous, and troublesome. Pecora.

As the rein-deer constitutes the sole riches of the Laplander, it may well be supposed that a constant attention to preserve and secure it, forms the chief employment of his life. It is no uncommon thing for one person to possess above 500 in a single herd.

These animals are much tormented by gnats, and a species of gadfly, called by Linnæus *œstrus tarandi*. The havock made among them by the latter is so great, that their skins are often found pierced almost full of holes.

The rein-deer has sometimes been brought into Europe, and Sir H. G. Liddle, Bart. had several of them in his possession, which he brought over from Lapland. They do not, however, seem to agree with the more temperate climates.

Gen. 40. CAMELOPARDALIS, *GIRAFFE*.

142 *Camelopardalis*, or Giraffe. Fig. 65.

Horns permanent, bony, covered with a bristly skin.
Front teeth in the lower jaw eight; the exterior one on each side deeply bilobate.

This genus was formed to include a single species that Linnæus and other naturalists had classed under *cervus;* but as the form and connection of its horns differ very materially from those of the deers and antelopes, it was judged better to constitute of it a new genus. This animal, with respect to its height, exceeds all other known quadrupeds, as it measures, when full grown, nearly 17 feet from the top of the head to the fore feet. The female is lower than the male. Notwithstanding the unusual proportions of this animal, its general form is in the highest degree elegant and picturesque; the head being small, the aspect mild, the neck extremely long and tapering, the fore parts much higher than the hinder, and the disposition of the colours singular and pleasing. At first view, the fore legs seem nearly twice the length of the hind; but this difference, on accurate examination, appears to result chiefly from the extraordinary height of the shoulders, compared with that of the thighs; accordingly, among the old writers who have described this animal, Petrus Gyllius perhaps approaches nearest to the truth, when he affirms, that all the legs or tibiæ of the camelopardi are of nearly equal length, but that the fore thighs are so long in comparison with the hind, that the back appears inclined like the roof of a house.

The horns of the camelopardalis differ in texture from those of all other horned quadrupeds, forming, as it were, a part of the skull, and consisting of a porous bony substance covered externally with short, coarse, bristly hair; they terminate abruptly, on a flattish or slightly convex head, but little wider than the other part of the horn, and edged with bristles all around the outline. On the middle of the forehead is a considerable protuberance, owing to an elevation or bony rising on that part of the skull. From the head to the middle of the back runs a short stiffish mane. The tail is of moderate length, of a cylindrical form, gradually tapering towards the end, and terminating in a tuft of long hair. The hoofs are moderately large and black.

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The fore part of the body is very thick and muscular, and the hind part thin and meagre. The ground colour of the animal is whitish, variegated on all parts with numerous, moderately large, and somewhat squarish spots, which in the male are brown, and in the female rusty. In the younger animals they are sometimes of a bright reddish-yellow. These marks or spots are of a somewhat less regular shape on the sides, than on the neck and shoulders.

This animal is an inhabitant of Africa, where it is found chiefly in Ethiopia, and other internal parts of the country, being rarely met with near the coasts. It resides in the forests, where it lives by browsing on the branches of trees. It is of a mild and timid disposition. When pursued, it trots so fast, that even a good horse is scarcely able to keep pace with it, and it continues its course for a long time without requiring rest. When it leaps, it lifts first the fore legs, and then the hinder ones, in the manner of a horse whose fore legs are tied together. Its general position, except when grazing, is, with the head and neck erect. It feeds principally on the leaves of trees, and particularly on those of a peculiar species of *mimosa*, common in the country where it is found, to which the extreme length of its legs and neck admirably adapt it. When it feeds from the ground, it is under the necessity of dividing its fore legs to a considerable distance. In preparing to lie down, it kneels like the camel.

It has been generally supposed that the giraffe possessed neither the power nor the strength to defend itself against the attacks of other animals; this, however, seems to be unfounded, for M. le Vaillant has asserted, that by its kicks it frequently wearies, discourages, and distances even the lion. The utility of the horns appears to be hitherto unknown; this writer says that they are not used as weapons of defence.

The giraffe is hunted by the Hottentots for the sake of its flesh, and its marrow, which latter they esteem as a great delicay.

143 Antilope.

Gen. 41. ANTILOPE. *ANTELOPES.*

Horns hollow, seated on a bony core, growing upwards, ringed or wreathed, permanent. Front teeth in the lower jaw eight. Canine teeth none.

The individuals of this genus, with the exception of two or three species, inhabit the hottest parts of the globe, or at least those parts of the temperate zones that lie so near the tropics as to form a doubtful climate. None, therefore, except the *saiga* and the *chamois*, are to be met with in Europe; and notwithstanding the warmth of South America is suited to their nature, not a single species has yet been discovered in any part of the new world. Their proper climates seem, therefore, to be those of Asia and Africa, where the species are very numerous.

As there appears a general agreement in the nature of the species that form this great genus, it will prevent needless repetition to observe, that the antilopes are animals generally of a most elegant and active make; of a restless and timid disposition; extremely watchful; of great vivacity; remarkably swift and agile, and most of their boundings so light, so elastic, as to strike the spectator with astonishment. What is very singular is, that they will stop in the midst of their course, gaze for a moment at their pursuers, and then resume their flight. Pecora.

As the chase of these animals is a favourite amusement with the eastern nations, from that may be collected proofs of the rapid speed of the antelope tribe. The greyhound, the fleetest of dogs, is usually unequal in the course, and the sportsman is obliged to call in the aid of the falcon, trained for the purpose, to seize on the animal, and impede its motions, in order to give the dogs an opportunity of overtaking it. In India and Persia a species of leopard is made use of in the chase. This is an animal that takes its prey not by swiftness of foot, but by the greatness of its springs, by motions similar to those of the antelope; but should the leopard fail in its first essay, the game escapes.

The fleetness of the antelope was proverbial in the country it inhabited, even in the earliest times: the speed of Asahel is beautifully compared to that of the tzebi, and the Gadites were said to be as swift as the antelopes upon the mountains. To this day the greatest compliment that can be paid to female beauty in the eastern regions is *Aine el czazel*, You have the eyes of an antelope.

Some species of antelopes form herds of 2000 or 3000, while others keep in troops of only five or six. They generally reside in hilly countries, though some inhabit plains. They often browse like the goat, and feed on the tender shoots of trees, from which their flesh acquires an excellent flavour. The flesh of most of the species is eaten, but that of some of them is said to taste of musk.

This is a very numerous genus, and most of the species are comparatively new, only six having been known to Linnæus, who ranked them under the genus *Capra*. The following are enumerated by Dr Shaw, though he confesses himself not certain that they are all distinct species.

A. *With straight or nearly straight horns.*

1. *Antilope Oryx*, Egyptian A. Gray, with black and white face, dusky dorsal stripe, and very long, tapering, sharply ringed horns.—2. *A. Leucoryx*, White A. Milk white, with very long, tapering, slightly-ringed horns.—3. *A. Gazella*, Gazel. Bay, with slightly bowed, tapering, wrinkled horns.—4. *A. Orcas*, Indian A. Slate coloured, with reddish head, black mane on the neck and breast, and tapering wreathed horns.—5. *A. Ourebi*, Ourebi. Rusty brown, with the breast, belly, hind part of the thighs, and insides of the limbs, white; and small horns.—6. *A. Orcotragus*, Klipspringer. Yellowish tawney; whitish below, with very straight upright tapering horns, slightly wrinkled at their base.—7. *A. Scriptus*, Harnessed A. Chesnut-coloured, with white crossed stripes on the sides; and tapering wreathed horns.—8. *A. Grimmia*, Guinea A. Yellowish bay, with short horns. and black bristly tuft on the forehead.—9. *A Pygmæa*, Pigmy A. With short convex horns, wrinkled at the base.

B. *With curved, bent, or twisted horns.*

10. *A. Picta*, Nyl-ghau. Slate-coloured, with the back of the neck and breast maned, the feet barred with black and white, and somewhat triangular horns bending forwards.—11. *A. Trajocamelus*, Indostan A. Gray, with maned neck and breast, dorsal protuberance, long

Pecora. long flocky tail, and tapering horns bending forwards. —12. *A. Bubalis*, Cervine A. Reddish brown, with large elongated head, thick, strongly wrinkled, lyrated horns, and longish tail.—13. *A. Strepsiceros*, Striped A. Reddish gray, with compressed spirally ridged horns, white longitudinal dorsal, and transverse lateral stripes. 14. *A. Cervicapra*, Common A. Tawney brown, white below, with round, lyrated, ringed horns.—15. *A. Lervia*, Gambian A. Reddish, with the nape of the neck bearded, and recurved wrinkled horns.—16. *A. Saiga*, Saiga. Yellowish gray, with distant, semitransparent, lyrated, and ringed horns.—17. *A. Gutturosa*, Chinese A. Tawney, whitish below, with lyrated yellowish ringed horns, and prominent throat.—18. *A. Subgutturosa* Guldensted's A. Gray-brown, white below, with lyrated horns, and tumid throat.—19. *A. Euchore*, Springer. Yellowish brown, white below, with dark lateral stripe, lyrated horns, and expansile white patch above the tail.—20. *A. Arundinacea*, Ritbock. Ash-coloured, white below, with ringed horns, bending forwards.—21. *A. Sylvatica*, Bosbock. Brown-white below, the hind part of the body spotted with white, the horns spirally, and ringed.—22. *A. Eleotragus*, Cinereous. A. Gray, snow-white below, with spirally ringed horns.—23. *A. Dorcas*, Barbary A. Fulvous brown, white below, with lateral-brown band, and lyrated horns.—24. *A. Kevella*, Flat-horned A. Tawney-brown, white below, with brown lateral band, and compressed lyrated horns.—25. *A. Pygarga*, White-faced A. Rusty brown, white below, with brown lateral band, white rump, and lyrated horns.—26. *A. Corinna*, Corine. Fulvous brown, white below, with dark lateral band, and sublyrated, rather erect, smoothish horns.—27. *A. Sumatrensis*, Sumatran A. Black, with recurved horns, and whitish bristly mane between the shoulders.—28. *A. Leucophæa*, Blue A. Blue gray, with roundish, arcuated, recurved, ringed horns.

C. *With hooked horns:*

29. *A. Gnu*, Gnu. Rusty brown, with maned neck, whitish tail, and horns directed forwards, and then suddenly backwards.—30. *A. Dama*, Nanguer. White, with fulvous back, and round horns, incurvated forwards.—31. *A. Ridunca*, Red A. Red brown, with round slightly ringed horns, recurved forwards at the tips.—32. *A. Rupicapra*, Chamois. Brown, with smooth upright horns, with the tips hooked forwards.

144 *Picta*, Nyl-ghau. Fig. 66. 10. *A. Picta*, the Nyl-ghau. This curious animal was first described by Dr W. Hunter, in the Philosophical Transactions, vol. lxi. Its height is about four feet to the top of the shoulders, and it measures nearly about the same in length from the bottom of the neck to the base of the tail. It is of a fine slate colour, with a large white spot below the throat, and two white bands above each foot. Its ears are large, edged with white, white within, where they are marked with two black stripes. Along the top of the neck there is a slight black mane, continued to some distance down the back, and on the breast there is a much thicker mane, or tuft of the same colour. The tail is moderately long, and tufted at the end; the horns are short, pointed, smooth, and three-cornered at the base. The female resembles the male in general appearance, but is considerably smaller. This animal is a native of the interior parts of India, and was a favourite object of the chase with the emperor Aurengzebe. Some years ago two of them were brought into England, and were kept some time by Dr Hunter, who has given the following account of its manners. History of the Species.

Although the nyl-ghau is usually reported to be exceedingly vicious, yet the one he had the care of was very gentle. It seemed pleased with every kind of familiarity, always licked the hand which either stroked it or gave it bread, and never once attempted to use its horns offensively. It seemed to have much dependence on the organs of smell, and snuffed keenly, and with considerable noise, whenever any person came within sight. It did the same when any food or drink was brought to it, and was so offended with an uncommon smell, or was so cautious, that it would not taste bread that was offered with a hand that had touched oil of turpentine or spirits.

Its manner of fighting was very particular; this was observed at Lord Clive's, where two males were put into a little inclosure, and it was thus related by his lordship. While they were at a considerable distance from each other, they prepared for the attack by falling down upon their fore knees, and when they were come within some yards, they made a spring, and darted against each other.

At the time that two of them were in his stable, Dr Hunter observed this particularity, that whenever any attempt was made on them, they immediately fell down upon their fore knees; and sometimes they would do so when he came before them; but as they never darted, he so little supposed this to be a hostile posture, that he rather supposed it to be expressive of a timid humility.

The intrepidity and force with which they dart against any object may be conceived, from an anecdote that has been related of the finest and largest of these animals that has ever been seen in England. A poor labouring man, without knowing that the animal was near him, and therefore neither meaning to offend, nor suspecting the danger, came up to the outside of the poles of the inclosure where it was kept; the nyl-ghau, with the swiftness of lightning, darted against the wood-work with such violence that he shattered it to pieces, and broke off one of his horns close to the root. This violence was supposed to occasion his death, which happened not long after. From this it appears, that at certain seasons the animal is vicious and fierce, however gentle it may be at other times.

145 Capra.

Gen. 42. CAPRA, *Goats.*

Horns hollow, turning upwards and backwards, rough, almost close at their base. Front teeth in the lower jaw eight. No tusks. Chin bearded in the male.

There are eight species; viz.

1. *C. Ibex*, Ibex. Gray brown, whitish below, with large horns, bending over the back; and bearded throat.—2. *C. Aegagrus*, Caucasan I. Gray brown, white below, with large, keeled, slightly wrinkled, bowed horns, and bearded throat.—3. **C. Hircus*, Common G. With bowed keeled horns, commonly turning outwards towards the end.—4. *C. Mambrica*, Syrian G. With

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With pendulous ears and horns reclined backwards.—5. *C. Angorensis*, Angora G. With very long, pendent, spirally-curled hair.—6. *C. Depressa*, African G. With very small depressed horns, closely incumbent on the head.—7. *C. Reversa*, Whidaw G. With upright horns, recurved at the tips.—*C. Capricornus*, Capricorn G. With short horns, turning forwards at the tips, and ringed on the sides.

146 Ibex. Fig. 67.

1. *Ibex*, Ibex.—As this is supposed to have been the original stock from which the common goat has been derived, we shall here give a short account of it.

This is an animal of great strength and activity, and is considerably larger than the common goat. It is of a deep hoary, or grayish brown colour, with a whiter shade below, and on the insides of the limbs. The body is thick and strong, the head rather small; eyes large, and the horns very large and long, so as sometimes to extend the whole length of the body. These are of a deep brown colour, and are marked above with transverse semicircular protuberances or knots. The legs are strong, with short hoofs; the tail is short, and the chin is furnished with a brown or dusky beard. The female is less than the male, and has smaller horns.

The ibex is found in several parts of Europe and Asia, chiefly in the mountainous parts of the country, especially the Carpathian and Pyrenean mountains, the Rhætian Alps, Mount Taurus, the high lands between Eastern Tartary and Siberia, and on the mountainous parts of the island of Candia.

The flesh of the young ibex is said to be in good esteem as an article of food. Its period of gestation is said to be the same as in the common goat; viz. five months.

In its general habits or manners the ibex resembles the common goat, but possesses every attribute of strength and activity in a degree proportioned to its natural state of wildness. It delights to climb mountains, and hang upon the brinks of precipices; and its chase is in consequence considered, like that of the *chamois*, as in the highest degree difficult and laborious. It is even said, that when hard pressed, this animal will fling itself down a steep precipice, and falling on his horns escape unhurt from its pursuers; nor will this appear in the least incredible, if we may rely on the truth of *Monardes*, who assures us that he saw a *Caucasan ibex* leap from the top of a high tower, and, falling on its horns, immediately spring up on its limbs, and leap about without having received the least apparent injury.

Two or three hunters usually associate in this perilous occupation; they are armed with rifle-barreled guns, and furnished with small bags of provisions; they erect a miserable hut of turf among the heights, where, without fire or covering, they pass the night; and on awaking in the morning, they not unfrequently find the entrance blocked up with snow three or four feet deep. Sometimes, in pursuit of this animal, being overtaken by darkness, amid crags and precipices, they are obliged to pass the whole night standing, and embraced together, in order to support each other, and to prevent themselves from sleeping.

For an account of the common goat, we refer our readers to Buffon and Mr Pennant's British Zoology, where they will meet with every thing of consequence respecting that useful animal.

Pecora.

Gen. 43. Ovis, *Sheep.*

147 Ovis.

Horns hollowed, wrinkled, turning backwards, and spirally twisted inwards. Front teeth eight in the lower jaw. Canine teeth none.

There are usually enumerated about eight species.

1. *Ovis Ammon*, Argali. With arched semicircular horns, flat below, and loose hairy dewlaps.—2. * *O. Aries*, Common S. With compressed lunated horns.—3. *O. Strepsiceros*, Cretan S. With upright, keeled, spirally twisted horns.—4. *O. Polycerata*. Many-horned S.—5. *O. Guineensis*, African S. With pendulous ears, loose hairy dewlaps, and head prominent at the back.—6. *O. Laticaudata*, Broad-tailed S.—7. *O. Steatophyga*, Fat-rumped S.—8. *O. Pudu*, Pudu. With smooth round diverging horns, and beardless throat.

148 *Aries* Common Sheep.

2. *Ovis Aries*, Common Sheep.—In its present state of domestication, the sheep seems so far removed from a state of nature as to make it a difficult matter to point out its origin. But naturalists are now generally of opinion, that it has proceeded from the argali or wild sheep, (the *mouflon* of Buffon).

Climate, food, and, above all, the unwearied arts of cultivation, contribute to render this animal in a peculiar manner, the creature of man, to whom it is obliged to trust entirely for its protection, and to whose necessities it largely contributes. Though singularly inoffensive, and harmless even to a proverb, it does not appear to be that stupid, inanimate creature described by Buffon: "devoid of every necessary art of self-preservation, without courage, and even deprived of every instinctive faculty, we are led to conclude that the sheep, of all other animals, is the most contemptible and stupid." But amidst those numerous flocks which range without controul on extensive mountains, where they seldom depend upon the aid of the shepherd, it will be found to assume a very different character. In those situations, a ram or wedder will boldly attack a single dog, and often come off victorious; but when the danger is more alarming, they have recourse to the collected strength of the whole flock. On such occasions they draw up into a compact body, placing the young and the females in the centre, while the males take the foremost rank, keeping close to each other. Thus an armed front is presented to all quarters, and cannot be easily attacked without danger of destruction to the assailant. In this manner they wait with firmness the approach of the enemy; nor does their courage fail them in the moment of attack; for when the aggressor advances within a few yards of the line, the rams dart upon him with such impetuosity, as lays him dead at their feet, unless he save himself by flight. Against the attacks of single dogs or foxes, when in this situation, they are perfectly secure. A ram, regardless of danger, will sometimes engage a bull, and his forehead being much harder than that of any other animal, he seldom fails to conquer. The bull, by lowering his head, receives the stroke of the ram between his eyes, which usually brings him to the ground.

In the selection of their food, few animals discover greater sagacity than the sheep, nor does any domestic animal shew more dexterity and cunning in its attempts to elude the vigilance of the shepherd, in order to steal such delicacies as are agreeable to its palate.

Besides

Pecora.

Besides its hardiness in enduring great severities of weather, the natural instinct of the sheep, in foreseeing the approach of a storm, is no less remarkable. In their endeavours to secure themselves under the shelter of some hill, whole flocks have frequently been buried for many days under a covering of snow, and have afterwards been taken out without any material injury.

There have been instances, where sheep, at the approach of a storm, have fled for shelter to a neighbouring cottage, and taken refuge under the same roof with their shepherd.

The variety in this creature is so great, that scarcely any two countries produce sheep of the same kind. There is found a manifest difference in all, either in the size, the covering, the shape or the horns. The woolly sheep is found only in Europe, and the temperate provinces of Asia. When transported into warmer climates, it loses its wool, and becomes rough and hairy, is less fertile, and its flesh no longer retains the same flavour.

No country produces finer sheep than Great Britain; their fleeces are large, and well adapted to the purposes of clothing. The Spanish fleeces are indeed finer, but for utility cannot be compared with those of Lincolnshire or Warwickshire. In Edward III.'s time, when wool was allowed to be exported, it brought into the kingdom 150,000l. per annum, at the rate of 2l. 10s. a pack. At this time, when our woollen manufactory stands unrivalled by any nation of the world, and when every method is taken to prevent this valuable commodity from being sent out of the kingdom, the annual value of wool shorn in England is supposed to be about 5,000,000l. sterling, and when manufactured together with the Spanish wool imported, amounting to about 600,000l. the total value must be above 20,000,000l.

Two of the front teeth in the sheep drop out before they are two years old, at which time they are replaced by others; at three years old, four of them are renewed, and the remainder at the age of four.

The ewe produces one or two lambs at a time, and sometimes, though rarely, three or four. She bears her young five months, and brings forth in the spring. The ram lives to the age of about 15 years, and begins to procreate at one. When castrated, they are called wedders. They then grow sooner fat, and the flesh becomes finer and better flavoured.

There is hardly any part of this animal that is not serviceable to man: of the fleece we make our clothes; the skin produces leather, of which are made gloves, parchment, and covers for books; the entrails are formed into strings for fiddles, and other musical instruments, likewise coverings for whips; its milk affords both butter and cheese, and its flesh is a delicate and wholesome food.

To the foregoing account of the sheep, for which we are indebted to Mr Bewick, we shall add a few remarks from Mr Cully's observations on live stock, on the most remarkable breeds of sheep at present cultivated in this country.

Mr Cully begins with those of Lincolnshire, which are of a large size, big-boned, and afford a greater quantity of wool than any other kind, owing to the rich fat marshes on which they feed, but their flesh is coarse, leaner, and not so finely flavoured as that of smaller sheep. The same breed extends, with some variations, through most of the midland counties of England. But the largest breed of sheep in this island, is to be met with on the banks of the Tees, which runs through a rich and fertile country, dividing the two counties of Yorkshire and Durham. This kind differs from the preceding, in their wool not being so long and heavy; their legs are longer, but finer boned, and support a thicker, firmer carcase. Their flesh is likewise much fatter, and finer grained. These sheep weigh from 25 to 45 lbs. per quarter; some have been fed to 50 lbs. and one in particular was killed which weighed 62lbs. 10 oz. per quarter, avoirdupois; a circumstance never before heard of in this island. The ewes of this breed generally bring forth two lambs each season; sometimes 3, 4, and even 5. As an instance of extraordinary fecundity, it deserves to be mentioned, that one of these ewes at the age of two years, brought forth six lambs at one time, the next season five, both within 11 months.

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The Dorsetshire breed is likewise remarkably prolific, the ewes being capable of bringing forth twice a year. It is from these, that the tables of our nobility and gentry are supplied with early lamb at Christmas, or sooner if required. Great numbers of those early victims to luxury are yearly sent to the London markets, where they are sold at the enormous price of 10s 6d. or perhaps 15s. per quarter. The manner of rearing the lamb is curious. They are imprisoned in little dark cabins; the ewes are fed with oil-cakes, hay, corn, turnips, cabbages, or any other food which the season of the year affords; these are given them in a field, contiguous to the apartments where the lambs are kept; and at proper intervals, the nurses are brought in to give suck to their young ones, while the attendants, at the same time make their lodgings perfectly clean, and litter them with fresh straw. Great attention is paid to this, as much of the success of rearing these unseasonable productions depends upon warmth and cleanliness.

The Dorsetshire sheep are mostly white-faced, their legs are long and small, and great numbers of them have no wool upon their bellies, which gives them an uncouth appearance. They produce a small quantity of wool, but of a good quality, from which our fine Wiltshire cloths are made. The mutton of these sheep is very sweet and well flavoured. The variations of this breed are spread through most of the southern counties, but the true kind is only to be found in Dorsetshire and Wiltshire. There is a breed, not unlike this, in Norfolk and Suffolk, but they are all gray or black-faced.

For some observations on feeding sheep, see AGRICULTURE, N° 600; for the best method of providing them with shelter against the weather, see FARRIERY, N° 109; and for some account of their diseases, with the most approved methods of treatment, see the same article, Part vi. *passim*.

Gen. 44. Bos, *Ox*.

149 Bos.

Horns concave, turned outwards, lunated, smooth. Front teeth eight in the lower jaw. Canine teeth none.

There are numerous varieties, but naturalists have not distinguished more than about six species; viz.

1. * *Bos Taurus*, Common O. With round horns curving outwards, and loose dewlap.—2. *B. Arnee*, Arnee. With

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With upright lunated horns, flat and wrinkled in their upper surface.—3. *B. Bubalus*, Buffalo. With horns lying backwards, turning inwards, and flat on the fore part.—4. *B. Moschatus*, Musk O. With very long pendent hair, and horns approximated at the base, bending inwards and downwards, and outwards at the tips.—5. *B. Grunniens*, Yak. With cylindric horns curving outwards, very long pendent hair, and extremely villous horse-like tail.—6. *B. Caffer*, Cape O. With the horns very broad at the base, then spreading downwards, next upwards, and at the tips curving inwards.

150 Common Ox.

1. *Bos Taurus*, Common Ox.—Few animals are more widely diffused over the globe than the common ox. Under different names, distinguishing several varieties, it is found in a wild or domestic state throughout almost the whole of the old continent, in most of the European and Asiatic islands, and is very abundant in several parts of America. It seems capable of enduring equally the rigours of heat and cold, and inhabits the frozen as well as the most scorching climates. Most animals preserve nature in their form with inflexible perseverance, but the ox appears to suit himself in every respect to the wants and conveniences of mankind. In no animal is there to be found a greater variety of kinds, and in none a more humble and tractable disposition. Though in many countries these animals are larger than those of Britain, yet on the whole our cattle are to be preferred, both for beauty of form, excellence of flesh, and general utility, to those of most other countries.

The climate of the British isles is, above most others, productive of the greatest variety and abundance of wholesome vegetables, which are most equally diffused throughout every part of them. Hence the number, variety, and excellence of our cattle, the richness of our dairies, and innumerable other advantages. Cæsar speaks of the numbers of our cattle, and adds that we neglected tillage, but lived on milk and flesh. Strabo takes notice of our plenty of milk, but says we were ignorant of the art of making cheese. Mela informs us that the wealth of the Britons consisted in cattle; and in his account of Ireland reports that such was the richness of the pastures in that kingdom, that the cattle would even burst if they were suffered to feed in them long at a time.

This preference of pasturage to tillage was delivered down from our British ancestors to much latter times; and continued equally prevalent during the whole period of our feodal government: the chieftain whose power and safety depended on the promptness of his vassals to execute his commands, found it his interest to encourage those employments that favoured that disposition; the vassal, who made it his glory to fly at the first call to the standard of his chieftain, was sure to prefer that employment which might be transacted by his family with equal success during his absence. Tillage would require an attendance incompatible with the services he owed the baron: while the former occupation not only gave leisure for those duties, but furnished the hospitable board of his lord with ample provision, of which the vassal was equally partaker. The relics of the larder of the elder Spencer are evident proofs of the plenty of cattle in his days; for after his winter provisions may have been supposed to be mostly consumed, there were found, so late as the month of May, in salt, the carcases of no fewer than 80 beeves, 600 bacons, and 600 muttons. The accounts of the several great feasts in after times, afford amazing instances of the quantity of cattle that were consumed in them. This was owing partly to the continued attachment of the people to grazing; partly to the preference that the English at all times gave to animal food. The quantity of cattle that appear from the latest calculation to have been consumed in London, is a sufficient argument of the vast plenty of these times; particularly when we consider the great advancement of tillage, and the numberless variety of provisions, unknown to past ages, that are now introduced into these kingdoms from all parts of the world.

Pecora.

This animal seems to have originated from a large wild variety called the bison, distinguished by its general largeness, particular strength of its fore parts, and a thick shaggy mane and beard about its neck and chin. This variety is found both in Europe and America, and from all this the varieties at present met with are descended. Besides the bison, and what may strictly be called the common ox, writers enumerate under this species the varieties called *zebu*, distinguished by a small single bunch over the shoulders; the *Indian ox*, having a very large double or treble protuberance over the shoulders; the *loose-horned ox*, whose horns seem attached only by the skin; the *boury*, having a protuberance on the back; the *Tinian ox*, of a white colour with black ears; and several other less important varieties. In Britain we distinguish chiefly the *Holstein* breed, the *Lancashire* and *Lincolnshire* breeds, the *Kyloe* or Highland cattle, the *Alderney* cow, and a particular species of wild cattle.

In most points of view, the female of this species is of more importance than the male. The cow goes with young nine months, and seldom produces more than one at a time. She has, as is well known, four teats, which, in proportion to her young, is a peculiarity scarcely to be found in any other animal, the females of which seldom have more teats than are sufficient to suckle the number of young which they produce.

The age of a cow is known by its horns. At the age of four years, a ring is formed at their roots, and every succeeding year another ring is added. Thus, by allowing three years before their appearance, and then reckoning the number of rings, the creature's age may be exactly known (H).

The quantity of milk given by cows is very various; some will yield only about six quarts in one day, while others give from 10 to 15, and sometimes even 20.

The

(H) In the earlier editions of his natural history, Buffon asserted that the bull and cow shed their horns at the age of three years, and at this time had them replaced by others that were permanent. As this mistake was corrected in one of his supplemental volumes, we should not now have thought it necessary to notice it, had we not seen it copied into a late work of considerable merit, and seemingly the result of much experience, Mr John Lawrence's Treatise on Cattle, p. 17.

Pecora.

The richness of the pasture contributes not a little to its increase. There have been instances of cows giving upwards of 30 quarts of milk in one day. In such cases there is a necessity for milking them thrice. From the milk of some cows, 12lbs. or 14lbs. of butter are made in a week.

It is a curious fact, that, in some instances, cows are naturally barren; and this is said to happen when a cow brings forth two calves, one of them a male, the other a female: the former is a perfect animal, but the latter is incapable of propagation, and is well known to farmers under the denomination of a *free-martin*. It resembles the ox, or spayed heifer, in figure, and is considerably larger than the cow. It is sometimes preserved by the farmer, for the purpose of yoking with the oxen, or fattening for the table. Mr Hunter observes, that the flesh of the free-martin, like that of the ox, is in common much finer in the fibre than either the bull or cow. It is supposed to exceed that of the heifer in delicacy of flavour, and bears a higher price at market*.

* See *Hunter on the animal economy.*

It is unnecessary to enlarge further on the ox in a domestic state. We shall therefore only give a short account of a very singular species of wild cattle that were formerly found in this country, but which are now nearly extinct.

Numerous herds of them were kept in several parts of England and Scotland, but they have been destroyed by various means. The only breeds now remaining in the kingdom are in the park at Chillingham-castle in Northumberland; at Wollaton in Nottinghamshire, the seat of Lord Middleton; at Gisburne, in Craven, Yorkshire; at Limehall in Cheshire, and at Chartley in Staffordshire.

The principal external appearances which distinguish this breed of cattle from all others are the following. Their colour is invariably white, muzzles black; the whole of the inside of the ear, and about one-third of the outside, from the tip downwards, red; horns white, with black tips, very fine, and bent upwards. Some of the bulls have a thin upright mane, about one inch and a half or two inches long.

At the first appearance of any person, they set off in full gallop, and at the distance of 200 or 300 yards, make a wheel round, and come boldly up again, tossing their heads in a menacing manner. On a sudden they make a full stop, at the distance of 40 or 50 yards, looking wildly at the object of their surprise; but upon the least motion being made, they all again turn round, and fly off with equal speed, but not to the same distance. Forming a short circle, and again returning with a bolder and more threatening aspect than before, they approach much nearer, probably within 30 yards, when they make another stand, and again fly off. This they do several times, shortening their distance, and advancing nearer, till they come within ten yards, when most people think it prudent to leave them, not choosing to provoke them further, for there is little doubt but in two or three turns more they would make an attack.

The mode of killing them was, perhaps, the only modern remains of the grandeur of ancient hunting. On notice being given, that a wild bull would be killed on a certain day, the inhabitants of the neighbourhood came mounted, and armed with guns, &c. sometimes to the amount of 100 horse and 500 foot, who stood upon walls, or got into trees, while the horsemen rode off the bull from the rest of the herd, until he stood at bay, when a marksman dismounted and shot. At some of these huntings, 20 or 30 shots have been fired before he was subdued. On such occasions the bleeding victim grew desperately furious, from the smarting of his wounds, and the shouts of savage joy that were echoing from every side. But, from the number of accidents that happened, this dangerous mode has been little practised of late years; the park-keeper alone generally shooting them with a rifled gun at one shot.

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When the cows calve, they hide their calves for a week or ten days in some sequestered situation, and go and suckle them two or three times a-day. If any person come near the calves, they clap their heads close to the ground, and lie like a hare in form, to hide themselves. This is a proof of their native wildness, and is corroborated by the following circumstance that happened to the writer of this narrative, who found a hidden calf, two days old, very lean, and very weak. On stroking its head, it got up, pawed two or three times like an old bull, bellowed very loud, stepped back a few steps, and butted at his legs with all its force: it then began to paw again, bellowed, stepped back, and butted as before; but knowing its intention, and stepping aside, it missed him, fell, and was so very weak that it could not rise, though it made several efforts. But it had done enough. The whole herd were alarmed, and coming to its rescue, obliged him to retire; for the dams will allow no person to touch their calves without attacking them with impetuous ferocity. When any one happens to be wounded, or is grown weak and feeble through age or weakness, the rest of the herd set upon it, and gore it to death.

The weight of the oxen is generally from 30 to 50 stones the four hind quarters, the cows about 30. The beef is finely marbled, and of excellent flavour *.

* *Bewick's Quadrupeds.*

There is scarcely any part of the ox that is not of some use to mankind. Boxes, combs, knife-handles, and drinking vessels, are made of the horns. These, when softened with boiling water, become so pliable, as to be formed into transparent plates for lanterns; an invention ascribed to King Alfred, who is said to have first used them to preserve his candle time-measures from the wind. Their dung is useful for manure. Glue is made of the cartilages, gristles, and the finer pieces of cuttings and parings of the hides, boiled in water till they become gelatinous, and the parts sufficiently dissolved, and then dried. The bone is a cheap substitute, in many instances, for ivory. The thinnest of the calves-skins are manufactured into vellum. The blood is used as the basis of Prussian blue. Saddlers and others use a fine sort of thread, prepared from the sinews, which is much stronger than any other equally fine. The hair is valuable in various manufactures, and the suet, fat, and tallow, for candles. The utility of the milk and cream is well known.

From the circumstance of these animals furnishing the Gentoos with milk, butter and cheese, their favourite food, they bear for them a superstitious veneration, founded thus principally in gratitude. There is scarcely

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scarcely a Gentoo to be found that would not, were he under a forced option, prefer sacrificing his parents or children to the slaying of a bull or cow.

For the application of oxen to the purposes of agriculture, and for the best methods of rearing, breeding, and feeding of cows and cattle, see AGRICULTURE; for an account of the internal structure of this genus, see ANATOMY, Part IV. Chap. IV. Sect. III.; for the construction of byres or cow-houses, with some observations on the feeding of cows and calves, see FARRIERY, Part IV.; and for the diseases incident to cattle, with their treatment, see the same article, Part VI.

151 *Grunniens*, Yak of Tartary. Fig. 71.

3. *B. Grunniens*, Yak, or Grunting Ox.—The best account of this singular species is that given by Captain Turner, in his account of an embassy to Tibet. It is as follows.

The yak of Tartary, called *soora goy* in Hindostan, and which Captain Turner terms the *bushy-tailed bull of Tibet*, is about the height of an English bull, which it resembles in the general figure of the body, head, and legs. He could discover between them no essential difference, except that the yak is covered all over with a thick coat of long hair. The head is rather short, crowned with two smooth round horns, which, tapering from the root upwards, terminate in sharp points; they are arched inwards, bending towards each other, but near the extremities are a little turned back. The ears are small; the forehead appears prominent, being adorned with much curling hair; the eyes are full and large; the nose small and convex; the nostrils small; the neck short, describing a curvature nearly equal both above and below; the withers are high and arched. The rump is low; over the shoulder rises a thick muscle, which seems to be the same kind of protuberance peculiar to the cattle of Hindostan, covered with a profusion of soft hair, which in general, is longer and more copious than that along the ridge of the back to the setting on of the tail. The tail is composed of a prodigious quantity of long, flowing, glossy hair, and is so abundantly furnished, that not a joint of it is perceptible; but it has much the appearance of a large cluster of hair artificially set on; the shoulders, rump, and upper part of the body, are clothed with a sort of thick soft wool, but the inferior parts with straight pendent hair that descends below the knee; and Captain Turner has seen it so long in some cattle, which were in high health and condition, as to trail upon the ground. From the chest between the legs, issues a large pointed tuft of straight hair, growing somewhat longer than the rest; the legs are very short; in every other respect he resembles the ordinary bull.

These cattle, though not large-boned, seem, from the profuse quantity of hair with which they are provided, to be of great bulk. They have a downcast heavy look, and appear, what indeed they are, sullen and suspicious, discovering much impatience at the near approach of strangers. They do not low loud like the cattle of Britain, any more than those of Hindostan, but make a low grunting noise, scarcely audible, and that but seldom, when under some impression of uneasiness. These cattle are pastured in the coldest parts of Tibet, upon the short herbage peculiar to the tops of mountains and bleak plains. The chain of mountains situated between the latitudes of 27° and 28°, which divides Tibet from Boutan, and whose summits are most commonly clothed with snow, is their favourite haunt. In this vicinity the southern glens afford them food and shelter during the severity of winter; in milder seasons, the northern aspect is more congenial to their nature, and admits a wider range. They are a very valuable property to the tribes of itinerant Tartars, called *Duckba*, who live in tents, and tend them from place to place; they at the same time afford their herdsmen an easy mode of conveyance, a good covering, and wholesome subsistence. They are never employed in agriculture, but are extremely useful as beasts of burden, for they are strong, sure-footed, and carry a great weight. Tents and ropes are manufactured of their hair; and among the humbler ranks of herdsmen, he has seen caps and jackets made of their skins. Their tails are esteemed throughout the east, as far as luxury and parade have any influence on the manners of the people; and on the continent of India they are found, under the denomination of *chowrics*, in the hands of the meanest grooms, as well as occasionally in those of the first minister of state. They are in universal use for driving away winged insects, flies, and musketoes, and are employed as ornamental furniture upon horses and elephants; yet the best requital with which the care of their keepers is at length rewarded, for selecting them good pastures, is in the abundant quantity of rich milk which they give, and the butter produced from it, which is most excellent. It is their custom to preserve this in skins or bladders, and the air being thus excluded from it, it will keep in this cold climate throughout the year; so that, after some time tending their herds, when a sufficient store is accumulated, it remains only to load their cattle, and drive them to a proper market with their own produce, which constitutes, to the utmost verge of Tartary, a most material article of commerce.

Dr Pallas informs us, that the calves of this species, when first born, are covered with a strong woolly hair, resembling that of a water spaniel, and that in about three months they begin to acquire the long hair of the throat, lower parts, and tail.

This animal was described by Ælian, under the name of Poephagus.

This order contains eight genera and about 82 species.

Bellua.

CHAP. VI. BELLUÆ.

Genus 45. EQUUS. *Horse.*

152 Equus.

Front teeth in the upper jaw six, parallel. In the lower jaw, six, somewhat projecting. Canine teeth, one on each side, in both jaws, remote from the rest. Feet with undivided hoofs.

Dr Shaw enumerates six species, viz. 1. * *Equus Caballus*, The Horse.—Tail uniformly covered with long hair.—2. *E. Hemionus*, Jickta. Of an uniform colour, without a distinct humeral cross, with naked tail haired at the tip.—3. * *E. Asinus*, Ass. Blackish cross over the shoulders, and tail tipped with long hair.—4. *E. Zebra*, Zebra. Variegated with numerous dark brown stripes.—5. *E. Quagga*, Quagga. Rather rusty,

Belluæ. ty, whitish below, striped above with brown. Spotted towards the hind parts.—6. *E. Bisulcus*, Cloven-footed H. With cloven hoofs.

153 *Caballus*, Common Horse. Fig. 72.

1. *Equus Caballus*, Common H.—Though it is in a state of domestication that we are chiefly to consider this most noble animal, we must first, however, mention a few circumstances respecting him in his native state of liberty.

Horses are found wild in several parts of the globe. Large herds of them are occasionally seen in the southern parts of Siberia, and in the great Mongalian deserts, and among the Kalkas to the north-west of China. They are also found in the deserts on each side the river Don; but it is supposed that these are descended from the Russian horses employed in the siege of Asoph, in the year 1697, who being turned loose for want of forage, escaped into the deserts, and their descendants have gradually acquired the appearance of native wildness.

The horse in its wild state is considerably smaller than most of our domestic horses, and possesses much less symmetry of form. He is extremely swift, active and vigilant, and like some other tribes of animals, these horses have always a centinel, who by a loud neigh gives notice to the herd of approaching danger, when they all gallop off with astonishing rapidity.

In South America there are also found large herds of wild horses; but these are of Spanish origin, derived from those that were carried over by the first conquerors of America. They are now become so numerous as to live in herds, some of which are said to consist of 10,000. As soon as they perceive domestic horses in the fields, they gallop to them, caress, and by a kind of grave and prolonged neighing, invite them to run off. The domestic horses are soon seduced, unite themselves to the independent herd, and depart along with them. It happens not unfrequently that travellers are stopped on the road by the effect of this desertion. To prevent this, they halt as soon as they perceive these wanderers, watch their own horses, and endeavour to frighten away the others. In this case the wild horses resort to stratagem; some are detached before, and the rest advance in a close column, which nothing can interrupt. If they are so alarmed as to be obliged to retire, they change their direction, but without suffering themselves to be dispersed. Sometimes they make several turns round those they wish to seduce, in order to frighten them, but they often retire after making one turn. When the inhabitants wish to convert some of these wild horses into domestic ones, which they find not very difficult to be done, persons mounted on horseback attack a troop of them, and when they approach them, they throw ropes with great care round their legs, which prevent them from running away. When brought home they are tied with a halter to a stake or tree, without food or drink for two or three days. After this they are cut, and then broke in the same manner as the domestic horses. They soon become docile; but if not carefully watched, will again join their wild friends.

The attention with which the wild horses of Siberia protect their young, is finely exemplified in a communication by a gentleman in that country to the editor of the Bee. The wild horse, he says, though a gregarious animal, does not go in promiscuous flocks like cattle or sheep; but each male chooses for himself a certain number of females, with whom alone he associates during the whole year, beating off every other male which offers to approach them. The strongest of course has the best haram, and the weaker are obliged to go without any. But when he has once fixed himself, he defends his own property, never attempting to encroach on that of another. The battles that are fought for the females at the beginning of the season are furious, and often prove fatal to one of the parties; but when the victory is once decided, the weakest never afterwards for that season dispute for superiority. History of the Species.

The horse, when he has once obtained his females, governs them with despotic authority. Whenever he calls upon them they must obey, otherwise they are punished severely; and the mares are so sensible of this, that they discover every symptom of the most perfect obedience to their lord and master.

His government, however, is founded on love, and his authority is exercised, rather for the protection of his subjects, than their injury. The great enemy they have there to dread is the wolf; and if the horse did not take care to keep them close together, so as to receive the benefit of his protection, they would be soon exterminated. It is the foals only that the wolf ever attacks, and against his attacks they are much upon their guard. When they see any appearance of danger, the horse gives the call, and they all instantly gallop up to him. The foals are then put all together, and the mares laying their heads together above the foals, form a circle all round with their heels outward, ready to strike their enemy if he approaches. The horse in the mean time remains without the circle to be ready to attack wherever the danger shall be greatest. One wolf dares never make the attack by himself. When they come up, the horse gallops round his family, trampling to death every one he can reach, or tearing them with his teeth; and so strong is his bite when thus enraged, that they frequently have been known with a single gnash of their teeth, to break the back of a wolf, and to kill him entirely. It seldom happens that the wolves prevail in this contest; and they so much dread the power of this noble animal, that they seldom make the attack unless when they are much pinched with hunger.

This breed of horses, though nimble and active, are not of a very large size. The hunting of these horses, which is only attempted by the natives for catching them alive, especially the young ones, is attended with difficulty and danger, and must not be attempted without due precautions *.

* *Bee*, vol. xvii. p. 98.

In a domestic or improved state, the horse is found in almost every country of the world, except within the Arctic circle; but he is found in his highest perfection in Arabia, where he seems as little degenerated in his race and powers as the lion or tiger of the African forests. To the Arabian hordes the horses are as dear as their children; and the constant intercourse arising from living in the same tent with their owner and his family, creates a familiarity that could not otherwise be effected, and a tractability that arises only from the kindest usage. They are the fleetest animals of the desert, and are so well trained as to stop in their

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most rapid course, by the slightest check of the rider. Unaccustomed to the spur, the least touch with the foot sets them again in motion, and so obedient are they to the rider's will, as to be directed in their course merely by the motion of a switch. They form the principal riches of many of the Arab tribes, who use them both in the chase and in their plundering expeditions. In the day time they are generally kept saddled at the door of the tent, prepared for any excursion their master may take. They never carry any heavy burdens, or are employed on long journeys. Their constant food, except in spring, when they get a little grass, is barley, which they are suffered to eat only during the night. The Arab, his wife, and children, always lie in the same apartment with the mare and foal, who, instead of injuring them, suffer the children to rest on their necks and bodies without incommoding them in the least. The poor gentle animals even seem afraid to move lest they should hurt them. The Arabs never beat or correct their horses, but always treat them with the utmost kindness. They talk to and reason with them.

The whole stock of a poor Arabian of the desert, consisted of a beautiful mare; this the French consul at Saïd offered to purchase, with an intention to send her to Louis XIV. The Arab, pressed by want, hesitated for a long time, but at length consented, on condition of receiving a very considerable sum of money, which he named. The consul wrote to France for permission to close the bargain, and having obtained it, sent immediately to the Arab the information. The man, so poor as to possess only a miserable rag, a covering for his body, arrived with his magnificent courser, and looking first at the gold, and then stedfastly at his mare, heaved a deep sigh. "To whom is it (he exclaimed) that I am going to yield thee up? To Europeans! who will tie thee close, who will beat thee, who will render thee miserable. Return with me, my beauty, my jewel! and rejoice the hearts of my children!" As he pronounced the last words, he sprang upon her back, and was out of sight almost in a moment.

The horses of France are thus characterized by Buffon. Those of Bretagne are pretty strongly made, and have generally black hair, or brown bay; and they have good legs and feet, with a hardy mouth, and a head short and fleshy, but in general they are rather clumsy. The horses of Franche Compté are said to have the legs of tigers, and belly of a hind; but they are short and thick, and of a middle size, being much more proper for drawing than riding. The horses of Gascony are not unlike those of Spain; but they are not so handsome nor so active, and therefore they are more proper to draw carriages. The Limosin horses are very vicious, and are good for little till they are six years old. Their colour is generally bay, or a bay brown. The horses of Normandy are much like those of Bretagne; and those of Poitou have good bodies, legs, feet and eyes, but they are far from being handsome.

The horses of Germany are much better and handsomer than those of the Low Countries. They are of great use for carriages, but much more for the army, and for drawing the artillery. They have a great deal of hair, especially about the legs. They are not large, but they are well set, and yet they have tender feet. The Hungarian horses are excellent for the coach, as well as for riding; but they are large, though well proportioned; and they are of all colours, and in general very swift. Belluæ.

The Danish horses are low, short, and square; but they have a fine head, and short hair. The horses of the Low Countries are very fit for the coach, and they are best known by the name of *Flanders mares*. The Polish horses are like the Danish, only they have not so fine a forehead; their colour is generally a bright bay, and that of the outward peel of an onion, and they are fiery and vicious. The horses of Switzerland are pretty much like those of Germany, which is not surprising, since the Germans purchase a great number of them. The horses of Piedmont are fiery, of a middle size, and of all sorts of colours; their legs are good and handsome, their eyes fine, their ears small, and their mouths good; but they do not carry their heads well.

The horses of Naples and Italy are generally ill made and lean, and yet they are good and useful, for they are light and proper for racing, though not for a long course; they never do well in a colder climate. The Spanish horses are very well made and handsome, as well as very active and nimble; they have good eyes, handsome legs and heads, and are easily managed; they are also good for racing, if they are well kept; however, they are not so good in northern climates as in their own country. The Turkish horses are of different shapes, but they are generally swift, though their mouths are bad. Most of them are white, though there are other colours, and they are large, hardy, strong, and fit for the road.

The horses of Barbary, commonly called *barbs*, have strong hoofs, and are more proper for racing than any others whatever; some have said they never grow old, because they preserve their vigour to the last. They are excellent stallions, and some of them are used as such in Britain; however, the Arabian horses are not quite so good as the Barbary, though some think they are both of the same kind; only those that are used to the deserts of Arabia are always in action. The horses of the Gold coast of Guinea are very few in number, and in other parts of that coast there are none at all; for many of the negroes, when they have been first brought over to our American plantations, have expressed great admiration at the sight of the horse, and even been afraid to come near one.

The horses of the Cape were originally brought from Persia, and they are small, of a chesnut colour, as the natives of that country are all wild, and could never be tamed. The horses of China are good, and more particularly those in the province of Yun Nan, for they are vigorous, though rather low. The horses of the Eluth Tartars are good and full of fire, and their size is much the same as that of the Polish horses; they are afraid of nothing, not even of lions and tigers, but this perhaps may be owing to use. In the country of the Moguls they are very numerous, and of all colours; they are generally of the middle size, though some are as large and handsome as those of Europe.

The breed of horses in Great Britain is as mixed as that of its inhabitants, The frequent introduction of foreign horses has given us a variety, that no single country

Bellue. country can boast of; most other countries produce only one kind, while ours, by a judicious mixture of the several species, by the happy difference of our soils, and by our superior skill in management, may triumph over the rest of *Europe*, in having brought each quality of this noble animal to the highest perfection.

In the annals of *Newmarket*, may be found instances of horses that have literally outstripped the wind. *Childers* is an amazing instance of rapidity, his speed having been more than once exerted equal to 82½ feet in a second, or nearly a mile in a minute. The same horse has also run the round course at *Newmarket* (which is about 400 yards less than four miles) in six minutes and 40 seconds, in which case his fleetness is to that of the swiftest *Barb* as four to three. This horse was allowed to be the fleetest that was ever bred in the world; he started repeatedly at Newmarket against the best horses of his time, and was never beaten. He won in different prizes to the amount of nearly 2000l. and was afterwards reserved as a stallion. His sire was an Arabian, sent by a gentleman as a present to his brother in England. Next to *Childers* was the famous *Eclipse*, who won prizes to a great amount. *High-flier* was accounted the best horse of his time in England. Though he never started after he was five years old, he won to the amount of nearly 9000l. He was never beaten, nor ever paid a forfeit. *Bay Malton*, the property of the late marquis of Rockingham, won, in seven prizes, nearly 6000l. At York he ran four miles in less than eight minutes.

One of the most remarkable instances of the work done by post-horses, in a short time, is that mentioned by Buffon, of the post-master of Stretton, who in the year 1745, rode on different horses along the London road no less than 215 miles in 11 hours and a half; a rate of above 18 miles an hour. In July 1788, a horse belonging to a gentleman of Billeter square, London, was, for a wager, trotted 30 miles in an hour and 25 minutes, which is above 21 miles in an hour.

No country can be compared with ours with respect to the strength and size of draught horses, and for the activity and strength of those that form our cavalry. In London there have been instances of a single horse drawing, for a short space, the weight of three tons; and some of the pack horses of the north usually carry burdens weighing upwards of 400lb. But the most remarkable proof of the strength of the British horses is in our mill horses, some of which have been known to carry, at one load, 13 measures of corn, that in the whole would amount to more than 900lb. in weight. Our cavalry in the late campaigns, showed over those of our allies, as well as the French, a great superiority both of strength and activity: the enemy was broken through by the impetuous charge of our squadrons, while the German horses, from their great weight, and inactive make, were unable to second our efforts, though those troops were actuated by the noblest ardour. The present cavalry of this island only supports its ancient glory; it was eminent in the earliest times; our scythed chariots, and the activity and good discipline of our horses, even struck terror into Cæsar's legions. It is now impossible to trace out this species, for those which exist among the indigenæ of *Great Britain*, such as the little horses of *Wales* and *Cornwall*, the hobbies of *Ireland*, and the shelties of *Scotland*, though admirably well adapted to the uses of those countries, could never have been equal to the work of war. Those we employ for that purpose, or for the draught, are an offspring of the *German* or *Flemish* breed, meliorated by our soil, and a judicious culture. History of the Species.

The English were ever attentive to an exact culture of these animals, and in very early times set a high value on their breed. The esteem that our horses were held in by foreigners so long ago as the reign of *Athelstan*, may be collected from a law of that monarch prohibiting their exportation, except they were designed as presents. These must have been the native kind, or the prohibition would have been needless, for our commerce was at that time too limited to receive improvement from any but the German kind, to which country their own breed could be of no value.

But when our intercourse with the other parts of Europe was enlarged, we soon laid hold of the advantages this gave of improving our breed. *Roger de Bellesme*, earl of Shrewsbury, is the first that is upon record. He introduced the Spanish stallions into his estate in *Powisland*, from which that part of Wales was for many ages celebrated for a swift and generous race of horses. *Giraldus Cambrensis*, who lived in the reign of Henry II. takes notice of it, and *Michael Drayton*, cotemporary with Shakespeare, sings their excellence in the 6th part of his *Polyalbion*. This kind was probably destined to mount our gallant nobility, our courteous knights for feats of chivalry, in the generous contests of the tilt-yard. From these sprung, to speak the language of the times, the flower of coursers, whose elegant form added charms to the rider, and whose activity and managed dexterity gained him the palm in that field of gallantry and romantic honour. That this was the chief object of cultivating the mixed breed, is very probable, for racing in its present form was not introduced into England till the reign of James I. the earliest notice of the diversion being in that reign. Croyden in the south, and Garterly in Yorkshire, were then famous horse courses. That it was not in vogue in the preceding reign, is reasonable to imagine, for among the numerous entertainments exhibited at Kenelworth by Elizabeth's favourite on her visit there, and where no amusement then practised was omitted, we do not find horse-racing among them.

Not that we deny this diversion to be known in these kingdoms in earlier times; we only assert a different mode of it, gentlemen being then their own jockeys, and riding their own horses. Lord Herbert of Cherbury enumerates it among the sports that gallant philosopher thought unworthy of a man of honour. "The exercise (says he) I do not approve of, is running of horses, there being much cheating in that kind; neither do I see why a brave man should delight in a creature whose chief use is to help him to run away."

As no kingdom can boast of parallel circumstances, so none can vie with us in the number of these noble quadrupeds. It would be extremely difficult to guess at the exact number of them, or to form a periodical account of their increase; the number seems very fluctuating. Mr William Fitz-Stephen relates, that in the reign of King Stephen, London alone poured out 20,000 horsemen in the wars of those times; yet we find that in the beginning of Queen Elizabeth's reign, the whole kingdom could not supply 2000 horses to form

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form our cavalry; and even in the year 1588, when the nation was in the most imminent danger from the Spanish invasion, all the cavalry which the nation could then furnish amounted only to 3000. To account for this difference we must imagine, that the number of horses which took the field in Stephen's reign was no more than an undisciplined rabble; the few that appeared under the banners of Elizabeth, a corps well formed, and such as might be opposed to such a formidable enemy as was then expected. But such is their present increase, that in a late war, the number employed was 13,375; and such is our improvement in the breed of horses, that most of those which are used in our waggons and carriages of different kinds, might be applied to the same purpose. Of those our capital alone employs near 22,000.

Of all quadrupeds, says Buffon, the horse, together with grandeur of stature, possesses the greatest elegance and proportion of parts. If we compare him with the animals immediately above and below him, we shall find that the ass is ill-made; that the head of the lion is too large; the limbs of the ox too short and slender; that the camel is deformed, and the elephant a shapeless mass. The regularity and proportion of the parts of his head, give him a light and sprightly aspect, which is well supported by the beauty of his chest. He elevates his head as if anxious to exalt himself above the condition of quadrupeds, and in this noble attitude he beholds man face to face.

We shall here give Buffon's description of what he considers as a perfect horse; but that this and similar descriptions may be better understood, we shall premise an explanation of the technical terms commonly employed in describing a horse. The figures prefixed to the terms refer to fig. 72. Plate CCCXIII. *The fore part.* 1. The forehead. 2. The temples. 3. Cavity above the eye. 4. The jaw. 5. The lips. 6. The nostrils. 7. The tip of the nose. 8. The chin. 9. The beard. 10. The neck. 11. The mane. 12. The fore-top. 13. The throat. 14. The withers. 15. The shoulders. 16. The chest. 17. The elbow. 18. The arm. 19. The plate vein. 20. The chesnut. 21. The knee. 22. The shank. 23. The main tendons. 24. The fetlock joint. 25. The fetlock. 26. The pastern. 27. The coronet. 28. The hoof. 29. The quarters. 30. The toe. 31. The heel.——*The body.* 32. The reins. 33. The fillets. 34. The ribs. 35. The belly. 36. The flanks.——*The hind part.* 37. The rump. 38. The tail. 39. The buttocks. 40. The haunches. 41. The stifle. 42. The thighs. 43. The hock. 44. The kerb. 45. The point of the hock.

When the horse is without blemish, says Buffon, the legs and thighs are clean, the knees straight, the shin and shank thin, and the back sinew strong and well braced. The sinews and the bones should be so distinct, as to make the legs appear thin and lathy, not full and round. The pastern joints should never be large and round; nor must there be any swelling near the coronet. The hock should be lean and dry, not puffed up with wind. With regard to the hoof, the coronet should be equally thick, and the horn shining and grayish. A white horn is a sign of a bad hoof, for it will wear out in a short time; and likewise when the horn is thin, it is liable to be spoiled in shoeing, and by travelling hard on stony grounds. This is best known when the shoe is taken off, for then the verge all round the sole will appear thin, and the horse will wince at the least touch of the pincers. Belluæ.

A strong foot has the fibres of the hoof very distinct, running in a direct line from the coronet to the toe, like the grain of wood. In this case, care must be taken to keep the foot moist and pliable. The greatest inconvenience attending a hard strong foot, is its being subject to rifts and fissures, which cleave the hoof quite through sometimes from the coronet down to the bottom.

A narrow heel is likewise a defect; and when it is not above two fingers in breadth, the foot is bad. A high heel causes a horse to trip and stumble often; and the low one, with long yielding pasterns, is very apt to be worn quite away on a journey. Too large a foot in proportion to the rest of the body, renders a horse weak and heavy.

The head of a horse should be small, and rather lean than fleshy. The ears should be small, erect, thin, sprightly, and pointed. The forehead, or brow, should have a star or snip thereon. The nose should rise a little, and the nostrils should be wide that he may breathe more freely. The muzzle should be small, and the mouth neither too deep nor too shallow. The jaws should be thin, and not approach too near together at the throat, nor too high upwards towards the onset, that the horse may have sufficient room to carry his head in an easy graceful posture. The eyes should be of a middle size, bright, lively, and full of fire. The tongue should be small, that it may not be too much pressed on by the bit; and it is a good sign when his mouth is full of white froth, as it shows that he will not soon be overheated.

The neck should be arched towards the middle, growing smaller by degrees from the breast and shoulders to the head. The hair of the mane should be long, small, and fine, and it will not be amiss if it be a little frizzled. The shoulders should be pretty long, the withers thin, and should gradually enlarge downwards, but so as to render the breast neither too narrow nor too thick. A thick shouldered horse soon tires, and trips and stumbles every minute, especially if he has at the same time a thick, large neck. When the breast is so narrow that the fore thighs almost touch, the horse is never good for much. A horse of a middle size should have the distance of five or six inches between his fore thighs, and there should be less distance between his feet than his thighs near the shoulders when he stands upright.

The body or carcase of a horse should be of a middling size in proportion to his bulk, and the back should sink a little below the withers; but the other parts should be straight, and no higher behind than before. He should also be home-ribbed, but the short ribs should not approach too near the haunches, and then he will have room to fetch his breath. When a horse's back is short in proportion to his bulk, and yet otherwise well limbed, he will hold out a journey, though he will travel slow. When he is tall, with very long legs, he is but of little value.

The wind should never be overlooked in the choice of a horse, and it may easily be known by his flanks, whether he is broken-winded, when he stands quiet in the stable;

Bellue. ble; because then he always pinches them in with a very slow motion, and drops them suddenly. A thick-winded horse fetches his breath often, and sometimes rattles and wheezes. This may be always discovered when he is put to brisk exercises.

The temper of a horse should always be observed; a vicious horse generally lays his ears close to his pole, shows the whites of his eyes, and looks sullen and dogged. An angry horse may be known by his frowning looks; and he generally seems to stand in a posture of defence. When he is very vicious, he pays no regard to the groom that feeds him, though some horses that are ticklish will lay back their ears, without being of a bad disposition. A fearful horse is apt to start, and never leaves off till he is old and useless. A fretful horse is very unfit for a journey, and you may discover his temper as soon as he gets out of the stable. A dull, heavy, sluggish horse, may be easily known, whatever tricks are used to rouse his spirits. With regard to the colour of a horse, the bright bay, and indeed all bays in general, are accounted good colours. The chesnut horse is generally to be preferred to the sorrel, unless the former happens to be party-coloured with white legs. Brown horses have generally black manes and tails, and their joints are of a rusty black. Those of this colour that are dapple are much handsomer than the rest. Horses of a shining black, and well marked, without too much white, are in high esteem for their beauty. A star, or blaze, or white muzzle, or one or more feet tipped with white, are generally thought to be rather better than those that are quite black.

Of grays, the dappled are accounted best, though the silver gray make a more beautiful appearance, and often prove good. The iron gray with white manes and tails, are thought not to be so hardy. Grays of every kind will turn white sooner or later; but the nutmeg gray, when the dappled parts incline to bay or chesnut, are said to be good hardy horses. Roan horses have a diversity of colours mixed together; but the white is more predominant than the rest. They are all generally hardy, and fit for the road; and some are exceeding good. Those of a strawberry colour most resemble the sorrel, and they are often marked with white on the legs and face. When the bay is blended with it, he seems to be tinctured with claret, and some of these prove to be very good. Dun, sallow, and cream-coloured horses have a list down their backs, and their manes and tails are black. Dun horses are seldom chosen by gentlemen, and yet they may be very useful to the country farmer. The swallow and cream-coloured are more esteemed, both for beauty and use. Those horses that are finely spotted with gray colours like leopards are a great rarity, and for that reason they are only in the hands of great men.

As in this country the form of the race-horse is more particularly attended to, we shall give the following rules for the best proportions of race-horses, as laid down by Mr Ferron.

"It has been observed by several authors, with good authority, that the head of a horse, divided into 22 equal parts, is the common measure for every part of the body; but if the head should appear too long or too short, that measure must be abandoned, to take the height of the body from the top of the withers to the ground. The third part of this measure will give you a just length for every other part of the body, and will shew you likewise how much the head was defective. History of the Species.

"A horse well made and beautiful in his fore hand, should measure 3 heads and 16 parts from the top of the head to the ground, the head standing in its natural position—the neck should measure one head and 13 parts from the withers to the top of the head,—the same measure gives the length of the neck from the top of the head to its termination in the chest—the height of the body should measure three heads from the withers to the ground—we observe the same measure from the rump to the ground,—the length of the body should measure three heads and four parts, from the point of the shoulder to the posterior part of the buttock.

"The line which falls from the articulation of the shoulder with the arm, should measure two heads and seven parts. This line must directly touch the hoof in front of the toe. If the foot should stand before this line, the leg will be in an oblique direction forward, which structure will confine the horse in all his actions, because the fore legs are obliged to come upon the ground nearly the same way as those of a horse going down hill; that is to say, the heels will touch the ground first, instead of the toes; but if the legs stand obliquely backwards from above, which is the opposite defect, the case is a great deal worse, because the animal is continually stumbling or even falling, on account of his feet being drawn too much under the belly, which situation obliges him to support too great a weight of the body. When this defect originates from the knees only, it bends the legs more or less, in which case the horse is called bow-legged. In either case such an animal must be rejected, and considered as unfit for a racer.

"The line which falls from the top of the fore leg to the point of the heel, should measure one head and 20 parts. This line is extended to show the perfect perpendicular position of the whole limb. The distance from the top of the withers to the stifle should measure one head and 20 parts; the same measure gives the distance from the rump to the elbow, or *vice versa*. The width of the neck should measure one head, taken from the top of the withers to the point of the shoulder.

"The narrowest part of the neck, and the breadth of the head taken a little below the eyes, measures 12 parts of a head each. The thickness of the body, from the middle of the back to the middle of the belly, should be one head and two parts. The same line continued to the ground, shews the centre of gravity of the horse's body. The distance from the root of the tail to the stifle, should measure one head and four parts. The same measure gives the length from the stifle to the hock. The same measure gives the distance from the hock to the ground. The breadth of the fore-arm, taken from the anterior parts of the elbow, should measure 11 parts of a head. The same measure gives the breadth of one of the hind-legs, taken just under the fold of the buttocks. The breadth of the hock, taken from its anterior part to the top of the os calcis, should measure seven parts of a head. The same measure gives the breadth of the head above the nostrils, measured sideway.

"The breadth of the head, taken from one eye to the other,

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other, should measure seven parts of a head. The same measure should give the distance between the fore legs. The thickness of the knees should measure five parts of a head. The same measure gives the breadth of the fore legs, just above the knees. The breadth of the hind fetlock joints should measure four parts of a head. The breadth of the fore pasterns should measure $2\frac{3}{4}$ parts of a head. The breadth of the coronet should measure $4\frac{1}{2}$ parts of a head. The breadth of the hinder legs or shank bones, should measure three parts of a head. The breadth of the fore legs should measure $2\frac{3}{4}$ parts of a head. The perpendicular line which falls from the articulation of the stifle, should touch the ground at the distance of half a head from the toe. Too far or too near this direction, proves the hock defective. If the hind feet advance too much under the belly, the hocks must be proportionably bent, and the weight of the body overcharging them, will of course increase the deformity. The feet being too much under the belly, will render it impossible for them to cover much ground; therefore their steps will be very much confined. The extension of the hocks terminating almost in an upright direction, will rather serve to raise the body than to push it forward. If, on the contrary, the hind feet stand too far behind this line, the hocks will be too strait, and their flexion too confined. The extension of the hinder parts taking place, only in a perpendicular direction backward, will produce a defect capable of retarding their speed *."

* *Ferron's Farriery*, p. 28.

The flesh of the horse is dark and coarse; but it has appeared from the accounts we have of long sieges, that it may be employed for food, and we are assured that it is by no means unpalatable. In fact, in some countries it is employed as food from choice. In the medical dictionary of the *Encyclopédie Methodique*, art. *Cheval*, tom. iv. p. 696. is a curious account of the mode of preparing an extraordinary part of this animal, that forms an ingredient in ragouts, with which some of the Mogul Tartars regale themselves in their most splendid entertainments.

The chief use to which the remains of the horse can be applied, is for collars, traces, and other parts of the harness; and thus, even after death, he preserves some analogy with his former employment. The hair of the mane is sometimes used in making wigs; that of the tail in making the bottoms of chairs, floor cloths, and cords, and to the angler in making lines.

For several other particulars respecting the horse, especially on the use of that animal among the Jews, on the management of horses upon and after a journey, and on the breeding of horses, see the article HORSE. On the use of horses in husbandry, with a comparative view of the profits arising from them and oxen, see the article AGRICULTURE, Part III.; for a short account of the anatomical structure of the horse, see FARRIERY, Part II.; for various methods of shoeing horses, and several other operations, see the same article, Part III.; for the best method of constructing stables, and the most proper food of horses, see Part IV.; and for the description and treatment of the diseases incident to horses, with the remedies employed, see Parts V. and VI. of the same article; and for the art of riding, training, and managing horses, see HORSEMANSHIP.

154 *Asinus.* The Ass. Fig. 37.

3. *E. Asinus*, the Ass.—It is unnecessary to describe the appearance of the domestic ass; but as this animal in his native state of wildness differs considerably from him who is the slave of man, we shall give a short description of the wild ass. Bellue.

Its usual colour is said to be white, or a pale silvery gray, with a slight shade of straw colour on the sides of the neck and body. Along the back runs a deep brown stripe of thickish wavy hair, to the beginning of the tail; this stripe is crossed over the shoulders, as in the tame animal, by another of similar colour; but it is said that this is peculiar to the male. The neck is furnished with a brown mane three or four inches long, consisting of soft woolly hair; the tail is tufted at the end by dusky hairs of about six inches in length; the forehead is arched, and the ears erect, pointed, and lined internally with white curling hairs. It stands higher on its limbs than the domesticated animal, and its legs are more slender in proportion. The hair on the whole body is very fine, bright, soft, and silky; and on some parts is marked by a few obscure undulations of a darker shade than the rest. Those which are found in Africa are said to be of a pale ash colour, rather than of the cast above described.

The food of the wild ass consists chiefly of saline, or bitter and lacteseent plants. It is also fond of salt or brackish water. The manners of these animals very much resemble those of the wild horse. They assemble in troops under the conduct of a leader, and are extremely shy and vigilant, and, like the former animals, dart off with the utmost rapidity on the sight of mankind. They have been at all times celebrated for their swiftness. Their voice resembles that of the common ass, but is somewhat shriller.

Wild asses are found in several parts of Asia, especially in the dry and mountainous deserts of Tartary, and in the southern parts of India and Persia. Large herds of them are also found in South America, where they were originally introduced by the Spaniards, and as the climate seems peculiarly favourable to them, they have multiplied to so great a number, as in some places to have become quite a nuisance. In the kingdom of Quito they are hunted for the purpose of domestication, and the hunting is conducted in the following manner.

A number of persons go on horseback, and are attended by Indians on foot. When arrived at the proper places, they form a circle in order to drive them into some valley, where, at full speed, they throw the noose and endeavour to halter them. The creatures, finding themselves inclosed, make very furious efforts to escape; and if only one forces his way through, they all follow with an irresistible impetuosity. However, when noosed, the hunters throw them down and secure them with fetters, and thus leave them till the chase is over. Then, in order to bring them away with greater facility, they pair them with tame asses; but this is not easily performed, for they are so remarkably fierce, that they often wound the persons who undertake to manage them.

They have all the swiftness of horses, and neither declivities nor precipices can retard their career. When attacked, they defend themselves with their heels and mouth with such address, that without slackening their pace, they often maim their pursuers. But the most remarkable property in these creatures is, that, after carrying their first load, their celerity leaves them, their

dangerous

Bellue. dangerous ferocity is lost, and they soon contract the stupid look and the dulness peculiar to their species. It is also observable that these creatures will not permit a horse to live among them. They always feed together, and if a horse happens to stray into the place where they graze, they all fall upon him, and without even giving him the choice of flying, bite and kick him till they leave him dead on the spot.

Though the ass is at present naturalized in this country, his introduction into Britain seems to have been very late, as he was entirely lost among us during the reign of Queen Elizabeth, when, as Hollinshed informs us, "our lande did yeelde no asses." There is, however, no reason to suppose that the ass was unknown among us some hundred years before, as we find mention made of him so early as the time of Athelred, and again in the reign of Henry III. so that the loss of them during the reign of Queen Elizabeth must have been owing to some accident. They were probably introduced again under the succeeding reign, when we renewed our intercourse with Spain, in which country this animal is much used, and where it has been brought to great perfection.

The qualities of this animal are so well known as to need no description. His gentleness, patience, and perseverance, are without example. He is temperate with regard to food, and eats contentedly the coarsest and most neglected herbage. If he give the preference to any vegetable, it is to the plantain, for which he will neglect every other herb in the pasture. In his water he is singularly nice, drinking only from the clearest brooks. He is so much afraid of wetting his feet, that, even when laden, he will turn aside to avoid the dirty parts of the road.

He is stronger, in proportion to his size, than the horse, but more sluggish, stubborn, and untractable. He is healthier than the horse, and of all other quadrupeds is least infested with lice or other vermin; probably owing to the extreme hardness and dryness of his skin. For the same reason, perhaps, he is less sensible of the goads of the whip, or the stinging of flies.

He is three or four years in coming to perfection, and lives to the age of 20, or sometimes 25 years. He sleeps much less than the horse, and never lies down for that purpose but when he is much fatigued. The she-ass goes 11 months with young, and seldom produces more than one at a time.

In pleading the cause of this injured and neglected animal, we cannot do better than copy the eulogy of the abbé la Pluche.

"I confess (says he) that the ass is not master of very shining qualities, but then he enjoys those that are very solid. If we resort to other animals for distinguished services, this at least furnishes us with such as are most necessary. His voice is not altogether melodious, nor his air majestic, nor his manners very lively; but then a fine voice has very little merit with people of solidity. With him the want of a noble air has its compensation in a mild and modest countenance; and instead of the boisterous and irregular qualities of the horse, which are frequently more incommodious than agreeable, the behaviour of the ass is entirely simple and unaffected; no supercilious and self-sufficient airs. He marches with a very uniform pace, and though he is not extraordinarily swift, he pursues his journey for a long time, and without intermission. He finishes his work in silence, serves you with a steady perseverance, and discovers no ostentation in his proceedings, which is certainly a considerable accomplishment in a domestic. His meat requires no preparation, for he is perfectly well contented with the first thistle that presents itself in his way. He does not pretend that any thing is due to him, and never appears squeamish or dissatisfied: he thankfully accepts whatever is offered to him; he has an elegant relish for the best things, and very civilly contents himself with the most indifferent. If he happens to be forgotten, or is fastened a little too far from his fodder, he entreats his master, in the most pathetic language he can utter, to be so good as to supply his necessities. It is very just that he should live, and he employs all his rhetoric with that view. When he has finished his expostulation, he patiently waits the arrival of a little bran, or a few withered leaves; and the moment he has dispatched his meal, he returns to his business, and marches on without a murmur or reply. His occupations have a tinge of the meanness of those who set him to work: but the judgments that are formed, both of the ass and his master, are equally partial. The employments of a judge, a man of consequence, and an officer of the revenue, have an important air, and their habit imposes on the spectators. On the contrary, the labour of the peasant has a mean and contemptible appearance, because his dress is poor and his condition despised. But we really make a false estimation of these particulars. It is the labour of the peasant which is most valuable, and alone truly necessary. Of what importance is it to us when a manager of the revenue glitters from head to foot with gold? We have no advantage from his labours. I confess, judges and advocates are, in some measure, necessary, but they are made so by our folly and misbehaviour; for they would no longer be wanted, could we conduct ourselves in a rational manner, But, on the other hand, we could on no account, and in no season or condition of life, be without the peasant and the artizan. These people may be considered as the souls and sinews of the community, and the support of our life. It is from them we are constantly deriving some accommodations for our wants. Our houses, our habits, our furniture, and our sustenance rise from their labours. Now, what would become of your vine dressers, gardeners, masons, and the generality of country people, that is to say, of two-thirds of all mankind, if they were destitute of men and horses to convey the commodities and materials which they employ and manufacture? The ass is perpetually at their service; he carries fruit, herbs, coal, wood, bricks, tiles, plaster, lime, and straw. The most abject offices are his ordinary lot, and it is as singular an advantage to this multitude of workmen, as well as to ourselves, to find a gentle, strong, and indefatigable animal, who, without expence or pride, furnishes our cities and villages with all sorts of commodities. A short comparison will complete the illustration of his services, and in some measure raise them from their obscurity. The horse very much resembles those nations who are fond of glitter and hurry; who are perpetually singing and dancing, and extremely studious to set off their exterior, and mix gaiety in all their actions. They are admirable on some distinguished and decisive occasions, but their fire frequently degenerates into ro-

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 mantic

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mantic enthusiasm; they fall into wild transports; they exhaust themselves, and lose the most favourable conjunctures for want of management and moderation. The ass, on the contrary, resembles those people who are naturally heavy and pacific, whose understanding and capacity are limited to husbandry or commerce, and who proceed in the same track without discomposure, and complete, with a positive air, whatever they have once undertaken."

The skin of this animal is very hard and elastic, and may be used for drums, shoes, and many other purposes. It is, we believe, seldom employed, except for the leaves of pocket memorandum books. The flesh of the wild ass is said to be good food, and easy of digestion.

155 Mule. Fig. 74.

The he-ass and the mare readily breed together, but the commerce between the stallion and the she-ass is said to be difficult. The produce of either connexion is the common mule, an animal superior both to the horse and ass for travelling over wild and mountainous tracts of country.

The common mule is very healthy, and will live above 30 years. It is found very serviceable in carrying burthens, particularly in mountainous places, where horses are not so sure-footed. The size and strength of our breed have lately been much improved by the importation of Spanish male asses; and it were much to be wished, that the useful qualities of this animal were more attended to; for, by proper care in its breaking, its natural obstinacy would in a great measure be corrected; and it might be formed with success, for the saddle, the draught, or the burthen.

People of the first quality in Spain are drawn by mules, where 50 or 60 guineas is no uncommon price for one of them; nor is it surprising, when we consider how far they excel the horse in travelling in a mountainous country, the mule being able to tread securely where the former can hardly stand. Their manner of going down the Alps, Andes, &c. is very extraordinary. In these passages, on one side, are steep eminences, and on the other frightful abysses; and as they generally follow the direction of the mountain, the road instead of lying in a level, forms at every little distance steep declivities of several hundred yards downward. These can only be descended by mules; and the animal itself seems sensible of the danger, and the caution to be used in such descents. When they come to the edge of one of these precipices, they stop without being checked by the rider, and if he inadvertently attempt to spur them on, they continue immoveable. They seem all this time ruminating on the danger that lies before them, and preparing themselves for the encounter. They not only attentively view the road, but tremble and snort at the danger. Having prepared for the descent, they place their fore feet in a posture as if they were stopping themselves; they then also put their hind feet together, but a little forward, as if they were going to lie down. In this attitude, having as it were taken a survey of the road, they slide down with the swiftness of a meteor. At this time all the rider has to do is to keep himself fast on the saddle without checking the reins, for the least motion is sufficient to destroy the equilibrium of the mule, in which case both he and his rider would perish. The address of these animals in this rapid descent is truly wonderful, for in their swiftest motion, when they seem to have lost all government of themselves, they follow exactly the different windings of the road, as if they had previously settled in their minds the route they were to follow, and had taken every precaution for their safety. On these occasions the natives place themselves along the sides of the mountains, and holding by the roots of trees, they animate the beasts with shouts, and encourage them to persevere. Some mules after having been long used in such journeys, acquire a sort of reputation for their safety and skill, and their value rises in proportion to their celebrity*.

Bellucæ.

* Bewick Quadrupeds.

Mules very rarely breed among each other, or with horses or asses, but a few instances of this kind have occurred.

156 Zebra. Fig. 75.

4. *E. Zebra*, the Zebra.—This may be considered as the most beautiful animal of the horse tribe, but it is that species with which we are least acquainted. It is wild in its nature, and so swift in its motions, that it can seldom be taken.

In size the zebra commonly equals the ass, and it is often considerably larger. Its form is much more elegant than that of the ass; its head and ears being well shaped, and of a moderate size. What, however, chiefly distinguishes this animal, is the beauty and symmetry of its colours. The ground of the skin is either a pure white or cream colour, sometimes with a slight shade of buff, or a pale rusty tinge, and the skin is ornamented on every part with numerous stripes of a black or blackish brown colour, disposed with the greatest regularity, so as to produce an appearance as if the animal were decorated with dark ribbands. These stripes run transversely on the body and limbs, and in a longitudinal direction down the face. The tail is moderately long, round, rather slender, marked with small blackish bars, and terminated by a pretty thick tuft of a blackish or brown colour.

The zebra is chiefly confined to the hotter parts of Africa, from Ethiopia to the Cape of Good Hope, where there are large herds. In manners they resemble the wild horse and ass, and are excessively swift and vigilant.

All attempts to tame this animal, so as to render it serviceable, have been hitherto fruitless. Wild and independent by nature, it seems ill adapted to servitude and restraint. If, however, it were taken young, and much care was bestowed on its education, it might very probably be in a great measure domesticated. A beautiful male zebra, at Exeter change, London, which was afterwards burnt to death by the mischievous act of a monkey setting fire to the straw on which he lay, appeared to have entirely lost his native wildness, and was so gentle as to suffer a child of six years old to sit quietly on his back, without exhibiting the least sign of displeasure. He was familiar even with strangers, and received those kind of caresses that are usually given to the horse with evident satisfaction.

One that was, some years ago, kept at Kew, seemed of a savage and fierce nature; no one dared venture to approach it, except the person who was accustomed to feed it, and who alone could mount on its back. Mr Edwards saw this animal eat a large paper of tobacco, paper and all; and was told it would eat flesh, and any kind of food whatever that was given it. This, however, might proceed from habit or necessity in its long voyage to this country; for in a native state these

Bellucæ. these animals all feed, like horses and asses, on vegetables.

In some parts about the Cape, where there are many zebras, there is a penalty of fifty rix-dollars inflicted on any person who shoots one of them; and wherever any of them happen to be caught alive, they are ordered to be sent to the governor.

It has been found that the zebra and the ass will breed together. For the purpose of ascertaining this, an experiment was made in the year 1773 with a zebra that belonged to Lord Clive. No account of this experiment appeared till Mr Nicholson published the substance of some answers made by Mr Parker to a set of questions proposed by Sir Joseph Banks.

The zebra was first covered by an Arabian horse. For this purpose it was found necessary to bind her, and she shewed great disgust. As she did not conceive, an English ass was procured, to which she showed a degree of aversion, scarcely if at all less than to the horse, and was subjected to him by the same means. The result of this trial not being more favourable than the other, recourse was had to the extraordinary expedient of painting another ass so as to resemble the zebra. Complete success attended this deception. When the animals were put together, the zebra at first appeared shy, but she received the embraces of the painted ass, and conceived. The offspring was a fine large male foal, which was just turned of six months old at the time of inquiry, namely, December 1773. It resembled both parents; the father as to make, and the mother as to colour; but the colour was not so strong, and the stripes on the shoulders were more conspicuous than on any other part. In answer to a question directed to that object, the relater states it as his opinion, that it would very probably propagate its species, as it did not appear at all to be like a mule.

In the course of the year after this information was received, his lordship died suddenly, and the collection of animals was disposed of. Sir Joseph Banks was then absent from town; and upon his return he was prevented by this circumstance, either from purchasing the animals, or acquiring any further information respecting the foal *.

* *Nichol. Journ.* 4to. vol. ii.

Genus 46. Hippopotamus.

151 Hippopotamus. Fig. 77.

Four front teeth in each jaw, the upper standing distant in pairs, lower prominent, the two middle longest; canine teeth solitary, lower extremity large, long curved, and obliquely truncated; feet armed at the margin with four hoofs.

There is only one species, viz. *H. Amphibius*, the Hippopotamus, Hippopotame, or River Horse.—The head of this animal is of an enormous size, and the mouth extremely wide. The ears are small and pointed, and very thickly lined within with short fine hairs. The eyes and nostrils are small in proportion to the bulk of the animal; on the lips are some strong hairs scattered in patches here and there. The hair on the body is very thin, of a whitish colour, and scarcely discernible at first sight. There is no mane on the neck, as some writers affirm, but the hairs on that part are rather thicker. The skin is very thick and strong, and of a dusky colour. The tail is about a foot long, tapering, compressed, and naked; the hoofs are divided into four parts. The legs are short and thick. In bulk it is second only to the elephant, and by some writers, is said even to be superior to him. The length of a male has been found to be 17 feet, the circumference of the body 15, the height nearly seven, the legs nearly three, the head three and a half, and the girth nearly nine. The mouth, when open, is above two feet wide, and furnished with 44 teeth of different figures. The cutting, and particularly the canine teeth of the lower jaw, are very long, and exceedingly hard and strong. The substance of the canine teeth is so white, fine, and hard, that it is preferred to ivory for making artificial teeth. The cutting teeth, especially those of the under jaw, are very long, cylindrical, and chamfered. The canine teeth are also long, crooked, prismatic, and sharp, like the tusks of the wild boar. The grinders are square, or oblong, like those of man, and so large that one of these teeth sometimes weighs three pounds. The tusks, according to Dr Sparrman, are 27 inches long. With such powerful arms, and such a prodigious strength of body, the hippopotamus might render himself formidable to every animal. But he is naturally of a mild disposition, and is formidable only when provoked. His bulk is so great that 12 oxen have been found necessary to draw ashore one that had been shot; and it is said that the hide is a load for a camel. Though he delights in the water, and appears to live in it as easily as on land, he has not, like the beaver, or otter, membranes between his toes. The great size of his belly renders his specific gravity nearly equal to that of water, and enables him to swim with ease. History of the Species.

These animals inhabit the rivers of Africa, from the Niger to Berg river, many miles north of the Cape of Good Hope. They formerly abounded in the rivers nearer the Cape, but are now almost extirpated; and to preserve the few which are left in Berg river, the governor absolutely prohibited the shooting of them without particular permission. They are not found in any of the African rivers that run into the Mediterranean, except in the Nile, and even there only in Upper Egypt, and in the fens and lakes of Ethiopia, through which the Nile passes. From the unwieldiness of his body and the shortness of his legs, the hippopotamus is not able to move fast upon land, and is there extremely timid. When pursued, he takes to the water, plunges in, sinks to the bottom, and is seen walking there at ease; he cannot, however, continue there long, without rising towards the surface; and in the day-time is so fearful of being discovered, that when he takes in fresh air the place is hardly perceptible, as he scarcely ventures to put his nose out of the water. In rivers not frequented by mankind, he is, however, less cautious, and there puts his whole head out of the water. If wounded, he will rise and attack boats or canoes with great fury; and is said frequently to sink them by biting large pieces out of the sides; for he is as bold in the water as he is timid on the land. In shallow rivers the hippopotamus makes deep holes in the bottom for the purpose of concealing his great bulk. When he quits the water, he usually puts out half his body at once, smells and looks around, but sometimes he rushes out with great impetuosity, and tramples down every thing in his way. During the night he leaves the rivers to graze upon the land, where he eats sugar canes,

History of the Species.

rushes, millet, rice, &c. consuming great quantities, and doing much damage in the cultivated fields. As he is so timid on land, it is however, not difficult to drive him off. The Egyptians (as Mr Hasselquist informs us) have a curious method of freeing themselves in some measure from this destructive animal. They remark the places he frequents most, and there lay a large quantity of pease; when the animal comes on shore hungry and voracious, he falls to eating what is nearest him, and, filling his belly with pease, they occasion an insupportable thirst; he then returns immediately into the river, and drinks large draughts of water, which by swelling the pease, cause his sudden death; for not long after the Egyptians find him dead on the shore, blown up as if killed wih strong poison. He also feeds on the roots of trees, which he loosens with his great tusks; but he never feeds on fish. These animals sleep on the reedy islands in the middle of the stream, and here they bring forth their young. There is but one male to a herd of females: these bring forth one young at a time on the land, but they suckle them in the water.

They are generally taken in pit-falls, and the poor people eat their flesh. Indeed the flesh of the young animals or calves, as they are called, is esteemed a dainty by the natives. In some parts they place in their corn grounds boards full of sharp irons, which these beasts strike into their feet, and thus become an easy prey. Sometimes they are taken in the water by striking them with harpoons fastened to cords, and 10 or 12 canoes are employed in the chase. The hippopotamus was known to the Romans. Scaurus treated the people with the sight of five crocodiles and one hippopotamus during his edileship, and exhibited them in a temporary lake. Augustus produced one at his triumph over Cleopatra.

This animal is the behemoth of Job, who admirably describes its manners, food, and haunts. *Vid.* chap. xl. ver. 15.

For an anatomical account of the skeleton of the hippopotamus by Cuvier, see *Ann. de Mus. Nat.* tom. iv. p. 299.

158 Tapir.

Genus 47. TAPIR. *TAPIR.*

Front teeth in both jaws 10. Canine teeth in both jaws single, incurvated. Grinders in both jaws five on each side, very broad. Feet with three hoofs and a false hoof on the fore feet.

There is only one species, viz.

159 *Americanus.* Fig 78.

T. Americanus, American Tapir, which is thus described by M. Bajon.

The figure of the tapir bears some general resemblance to that of a hog; but he is of the height of a small mule, having an extremely thick body and short legs. He is covered with hair of a longer kind than the horse or ass; but not so long nor thick as that of a hog. His mane, which is straight, is but little longer than the rest of the hair, and reaches from the top of the head to the shoulders; the head is large and long, the eyes very small and black: the ears black, and somewhat like those of a hog. He is provided with a trunk on the upper lip of nearly a foot long, the movements of which are extremely supple, and in which resides the organ of smell, as in the elephant, and which he extends in order to grasp fruits, &c. The two nostrils part the end of the trunk. The tail is only two inches long, and is nearly naked. The hair of the body is of a somewhat deep brown; the limbs short and thick; the feet very large, and rather rounded; the fore feet have four toes, and the hind three: all the toes are covered with a hard thick hoof or horn. Though the head is very large, it contains but a very small brain; the jaws are much elongated, and furnished, in general, with 40 teeth; but sometimes there are more, and sometimes fewer. The cutting teeth are sharp-edged, and are the teeth which vary as to number. After the cutting teeth, we find a canine tooth on each side, both above and below, which have a good deal of resemblance to those of a boar; we then find a small space or interval without teeth, and then follow the grinders, which are very large, with very broad surfaces. Bellue.

M. Bajon imagined, that, on dissection, he discovered three stomachs within this animal; and therefore he considered it to be a ruminating animal; but this was afterwards found to be a mistake. It appeared, on dissecting a tapir brought alive to Paris, that the stomach was very large, and was contracted in two places, but was still a single uniform stomach.

The female tapir is larger than the male, and has a weaker voice.

The tapir was once considered as an amphibious animal; but this opinion seems to be erroneous.

For an anatomical account of the skeleton of the tapir, by Cuvier, see *Annales de Mus. Nat.* tom. iii. 132.

160 Sus.

Genus 48. SUS. *HOG.*

Front teeth in the upper jaw four, converging. In the lower jaw six, projecting. Canine teeth or tusks, in the upper jaw two, long, exserted. Snout truncated, prominent, moveable. Feet cloven.

In their manners the whole of this tribe nearly resemble each other, being in general filthy and disgusting, and very fond of wallowing in the mire. They feed indifferently on animal and vegetable food, but seem to prefer the latter when they can obtain it. They are particularly fond of acorns, beech mast, and similar fruits, and with their strong tendinous snout they dig up the earth in search of roots. They are exceedingly prolific.

There are about five species, viz.

1. * *S. Scrofa*, Common H. Body bristled in front; tail hairy.—2. *S. Ethiopicus*, Ethiopian H. Wattles beneath the eyes.—3. *S. Africanus*, Cape Verd H. Only two front teeth.—4. *S. Babyrussa*, Babyroussa, or Horned H. The two upper tusks growing from the upper part of the front.—5. *S. Tajassu*, Pacary. Tailless, with a glandular orifice on the back.

161 *Scrofa*, Common Hog. Fig. 79.

1. *S. Scrofa*, Common H.—The common hog is found either in a wild or domestic state, in almost all the temperate parts of Europe and Asia; but it is not met with in the most northern parts of these continents. It is also found in the upper parts of Africa. Dr Shaw remarks, that it is not indigenous to the British isles; but Mr Pennant asserts, that the wild boar was formerly a native of this country, as appears from the laws of Hoel dda, who permitted his grand huntsman to chase that animal from the middle of November to the beginning of December. William the Conqueror punished, with the loss of their eyes, any that were convicted of

Belluæ. killing the wild boar, the stag, or the roe-buck; and Fitz-Stephens tells us, that the vast forest that in his time grew on the north side of London, was the retreat of stags, fallow-deer, wild boars, and bulls.

The wild boar inhabits woods, living on various kinds of vegetables, viz. roots, mast, acorns, &c. &c. It also occasionally devours animal food. It is, in general considerably smaller than the domestic hog, and is of a dark brindled gray colour, sometimes blackish; but, when only a year or two old, is of a pale red or dull yellowish brown cast; and, when quite young, is marked by alternate dusky and pale stripes disposed longitudinally on each side the body. Between the bristles, next the skin, is a finer or softer hair, of a woolly or curling nature. The snout is somewhat longer in proportion than that of the domestic animal; but the principal difference is in the superior length and size of the tusks, which are often several inches long, and capable of inflicting the most severe and fatal wounds.

The hunting of the wild boar forms one of the amusements of the great in some parts of Germany, Poland, &c. and is a chase of some difficulty and danger, not on account of the swiftness, but the ferocity of the animal.

Wild boars, says Buffon, which have not passed their third year, are called by the hunters *beasts of company*, because previous to this age they do not separate, but follow their common parent. They never wander alone till they have acquired sufficient strength to resist the attacks of the wolf. These animals, when they have young, form a kind of flocks; and it is upon this alone that their safety depends. When attacked, the largest and strongest front the enemy, and by pressing all round against the weaker, force them into the centre. Domestic hogs are also observed to defend themselves in a similar manner. The wild boar is hunted with dogs, or killed by surprise, during the night, when the moon shines. As he flies slowly, leaves a strong odour behind him, and defends himself against the dogs, and often wounds them dangerously, fine hunting dogs are unnecessary, and would have their nose spoiled, and acquire a habit of moving slowly by hunting him. Mastiffs, with very little training, are sufficient. The oldest boars, which are known by the track of their feet, should alone be hunted; a young boar of three years old is difficult to be attacked, because he runs very far without stopping; but the old boars do not run far, allow the dogs to come near, and often stop to repel them. During the day the boar commonly keeps in his soil, which is in the most sequestered parts of the woods, and comes out by night in quest of food; and in summer, when the grain is ripe, it is easy to surprise him among the cultivated fields, which he frequents every night.

As the wild boar advances in age, after the period of three or four years, he becomes less dangerous, on account of the growth of his tusks, which turn up, or make so large a curve, as often rather to impede than assist his intentions of wounding with them.

According to the French newspapers for the year 1787, a wild boar, of most extraordinary size, was killed in the neighbourhood of Cognac in Angumois, which had often escaped from the hunters, had received many gun-shot wounds, and had cost the lives of several dogs and men each time of attacking him. When this animal was at length slain, several bullets were said to have been found between his skin and flesh. M. Sonnini, who details this anecdote from the public papers, observes, that if the relation had not been given by hunters of distinguished order, and too well acquainted with these animals to have made any mistake, we might imagine that this formidable creature, which had long committed its ravages in the park of Cognac, belonged to a totally different species. It was of enormous size, with a very long head, a very sharp or pointed snout; and its mouth was armed with teeth of a very singular form. The hairs of the body were white, those of the head yellowish, the neck marked with a black band in form of a cravat, and the ears large and straight; and what appears surprising, considering its size, it was of uncommon swiftness. History of the Species.

In a domestic state the sow brings forth twice a year, and produces from 10 to 20 at a litter. She goes rather more than four months with young. At the time of bringing forth she must be carefully watched, as she sometimes devours her young, and it is still more necessary to keep off the boar, who may destroy the whole litter.

There are several varieties of the hog bred in this country; but those in greatest request are generally known by the name of *Berkshire pigs*. These are usually of a reddish-brown colour, with black spots; they have large ears hanging over their eyes, are short-legged, small-boned, and very easily fattened. Mr Culley mentions one of these that was killed at Congleton in Cheshire, which measured from the nose to the end of the tail nine feet eight inches, was four feet and a half high, and weighed, when killed, 86 stones 11lbs. avoirdupois.

The Chinese, or black breed, are now very common in England. They are smaller, have shorter legs, and their flesh is whiter and sweeter than the common kind. Of this sort were those found in New Guinea, which proved so seasonable a relief to our circumnavigators, when that country was first visited by them. There are likewise great numbers of them in the Friendly and Society islands, the Marquesas, and many other of the lately discovered islands in the South seas. These are fed with plantains, bread-fruit, and yams; and are exceedingly fat. They are frequently seen by the natives in their canoes, swimming from one island to another, and killed by them with lances and arrows.

The hog species, though very numerous, and diffused over Europe, Asia, and Africa, did not exist in America, till transported thither by the Spaniards. In many places they have multiplied exceedingly, and become wild. They resemble the domestic hog, but their bodies are shorter, and their snout and skin thicker.

This animal has been compared to a miser, who is useless and rapacious in his life; but on his death becomes of public use, by the very effects of his sordid manners. The hog, during life, does not render the least service to mankind, except in removing that filth which other animals reject. His more than common brutality urges him to devour even his own offspring. All other domestic quadrupeds shew some degree of respect to mankind, and even a sort of tenderness for us in our helpless years; but this animal will devour infants, whenever it has opportunity.

The parts of this animal are finely adapted to its way of life. As its method of feeding is by turning up the earth

History of the Species.

earth for roots of different kinds, so nature has given it a more prone form than other animals; a strong brawny neck, eyes small, and placed high in the head, a long snout, nose callous and tough, and a quick sense of smelling to trace out its food. Its intestines have a strong resemblance to those of the human species; a circumstance that should mortify our pride. The external form of its body is very unwieldy, yet, by the strength of its tendons, the wild boar is enabled to fly from the hunters with amazing agility. The back toe on the feet of this animal prevents it from slipping while it descends declivities, and must be of singular use when pursued; yet, notwithstanding its powers of motion, it is by nature stupid, inactive, and drowsy; much inclined to increase in fat, which is disposed in a different manner from other animals, and forms a regular coat over the whole body. It is restless at a change of weather, and in certain high winds is so agitated as to run violently, screaming horribly at the same time: it is fond of wallowing in the dirt, either to cool its surfeited body, or to destroy the lice, ticks, and other insects with which it is infested. Its diseases generally arise from intemperance: measles, imposthumes, and scrophulous complaints, are reckoned among them.

Linnæus observes that its flesh is a wholesome food for athletic constitutions, or those that use much exercise, but bad for such as lead a sedentary life. It is of most universal use, and furnishes numberless materials for epicurism, among which brawn is a kind peculiar to England. The flesh of the hog is an article of the first importance to a naval and commercial nation, for it takes salt better than any other kind, and consequently is capable of being preserved longer. The lard is of great use in medicine, being an ingredient in several sorts of plasters, either pure, or in the form of pomatum; and the bristles are formed into brushes of several kinds.

162 *Babyrussa.* Fig. 80.

4. *S. Babyrussa*, the Babyroussa.—This animal nearly resembles the common hog in size; but his body is rather longer, his limbs more slender, and, instead of bristles, he is covered with fine short, rather woolly hair, of a deep brown or blackish colour, with only a few bristles on the upper and hinder parts of the back. It is principally distinguished from other species by the very extraordinary position and form of the upper tusks. These, instead of being situated internally on the edge of the jaw, as in other animals, are placed without, through the skin of the snout, turning upwards towards the forehead. As the animal advances in age, those tusks become so extremely long and curved, as to touch the forehead, and then bend downwards, when they must lose their power as offensive weapons, for which they were probably intended in the younger animal. These upper tusks are of a fine hard grain, and may be used as ivory. The tusks of the lower jaw resemble those of the other species, and are very long, sharp, and curved; but not nearly so large as those of the upper jaw. The eyes are small; the ears erect and pointed; the tail pretty long, slender, and terminated by a tuft of long hairs.

This species is gregarious, and found in large herds in several parts of Java, Amboyna, and other Indian islands. It feeds entirely on vegetables, and often eats the leaves of trees. When sleeping or resting itself in a standing posture, it is said to hook its tusks across the lower branches of the trees by way of support. When pursued, these animals will often plunge into a river, or even into the sea, and they can swim with great ease, and to a vast distance. Their voice is said to resemble that of the common hog; but it is sometimes a strong, loud, growling note. It is occasionally domesticated by the natives of the Indian islands, and its flesh is considered as wholesome food. Bellue.

This order contains four genera and 13 species.

In the class MAMMALIA, we have enumerated or described about 537 species; of which the following table shews the number in each genus.

SIMIA contains	62	species
LEMUR,	13	
GALEOPITHECUS,	1	
VESPERTILIO,	24	
BRADYPUS,	3	
MYRMECOPHAGA, about	6	
MANIS,	3	
DASYPUS, about	6	
RHINOCEROS, perhaps	3	
ELEPHAS,	1	
PLATYPUS,	1	
TRICHECUS, about	7	
PHOCA,	19	
CANIS, about	23	
FELIS, about	25	
VIVERRA, about	48	
LUTRA,	8	
URSUS, about	9	
DIDELPHIS, about	18	
DASYURUS,	6	
PERAMELES,	2	
WOMBAT,	1	
MACROPUS,	2	
TALPA,	7	
SOREX,	16	
ERINACEUS,	5	
HYSTRIX,	6	
CAVIA,	7	
CASTOR,	2	
MUS, about	44	
HYDROMYS,	3	
ARCTOMYS,	8	
SCIURUS,	26	
MYOXUS,	7	
DIPUS,	6	
LEPUS,	12	
HYRAX,	3	
CAMELUS,	7	
MOSCHUS,	7	
CERVUS,	12	
CAMELOPARDALIS,	1	
ANTILOPE,	32	
CAPRA,	8	
OVIS,	8	
BOS,	6	
EQUUS,	6	
HIPPOPOTAMUS,	1	
TAPIR,	1	
SUS,	5	
Total	537	

Of these about 36 are found in Britain.

The

Explanation of the Plates.

The compiler of this article is conscious that it labours under many deficiencies; that many animals, which ought to have been described, are merely enumerated; and that the accounts of several, which are usually considered as important objects of natural history, are much less complete than might have been expected. For many of these defects he does not hold himself accountable. From the very limited space within which he was obliged to confine the article, it was necessary, either that he should treat of every species in a very concise manner, so as to make the treatise merely a tabular sketch, or that he should content himself with a systematic arrangement of all the mammalia at present known, and enlarge only on a few of the more important species. He has chosen the latter alternative, which, by making the article more interesting to the generality of readers, seems best adapted to the nature of this work; while the systematic arrangement, with the specific characters will assist the naturalist who knows where to refer for a particular account of the individuals.

Explanation of the Plates.

EXPLANATION OF THE PLATES.

Plate CCCI.

Fig. 1. *Simia Satyrus*, Oran Otan.
Fig. 2. *Simia Inuus*, Magot or Barbary Ape.
Fig. 3. *Simia Sylvanus*, Pygmy.
Fig. 4. *Simia Sphinx*, Great Baboon.
Fig. 5. *Simia Beelzebul*, Alouatte, or Preacher Monkey.
Fig. 6. *Simia Argentata*, Mico or Fair Monkey.

Plate CCCII.

Fig. 7. *Lemur Tardigradus*, Slow Lemur.
Fig. 8. *Galeopithecus Volans*, Flying Calugo.
Fig. 9. *Vespertilio Auritus*, Long-eared Bat.
Fig. 10. *Vespertilio Vampyrus*, Vampyre Bat.
Fig. 11. *Bradypus Tridactylus*, Three-toed Sloth.
Fig. 12. *Myrmecophaga Jubata*, Great Ant-Eater.

Plate CCCIII.

Fig. 13. *Manis Pentadactyla*, Pangolin, or Short-tailed Manis.
Fig. 14. *Manis Tetradactyla*, Long-tailed Manis.
Fig. 15. *Dasypus Sexcinctus*, Six-banded Armadillo.
Fig. 16. *Rhinoceros Unicornis*, Single-horned Rhinoceros.

Plate CCCIV.

Fig. 17. *Elephas Maximus*, Elephant.
Fig. 18. *Sukotyro.*
Fig. 19. *Platypus Anatinus*, Duck-billed Platypus.
Fig. 20. *Trichecus Rosmarus*, Arctic Walrus.

Plate CCCV.

Fig. 21. *Phoca Vitulina*, Common Seal, or Sea-calf.
Fig. 22. *Canis Domesticus*, Common Dog.
Var. Shepherd's Dog.
Fig. 23. Mastiff.
Fig. 24. Foxhound.
Fig. 25. Terrier.
Fig. 26. Greyhound.
Fig. 27. Irish Greyhound.

Plate CCCVI.

Fig. 28. *Canis Lupus*, Wolf.
Fig. 29. *Canis Hyæna*, Hyæna.
Fig. 30. *Canis Aureus*, Jackal.
Fig. 31. *Canis Zerda*, Fennec.
Fig. 32. *Felis Leo*, Lion.
Fig. 33. *Felis Tigris*, Tiger.

Plate CCCVII.

Fig. 34. *Felis Catus*, Wild Cat.
Fig. 35. *Viverra Ichneumon*, Ichneumon.
Fig. 36. *Viverra Civetta*, Civet Cat.
Fig. 37. *Viverra Foina*, Marten.
Fig. 38. *Viverra Furo*, Ferret.
Fig. 39. *Lutra Vulgaris*, Common Otter.

Plate CCCVIII.

Fig. 40. *Ursus Arctos*, Brown Bear.
Fig. 41. *Ursus Maritimus*, White or Polar Bear.
Fig. 42. *Ursus Meles*, Badger.
Fig. 43. *Didelphis Virginiana*, Virginian Opossum.
Fig. 44. *Didelphis Dorsigera*, Merian Opossum.
Fig. 45. *Dasyurus Viverrinus*, Viverrine Dasyurus.

Plate CCCIX.

Fig. 46. The *Wombat.*
Fig. 47. *Macropus Major*, Kanguroo.
Fig. 48. *Talpa Radiata*, Radiated Mole.
Fig. 49. *Sorex Araneus*, Common Shrew.
Fig. 50. *Erinaceus Europæus*, Common Hedgehog.
Fig. 51. *Hystrix Cristata*, Porcupine.
Fig. 52. *Castor Fiber*, Common Beaver.

Plate CCCX.

Fig. 53. *Cavia Cobaya*, Restless Cavy, or Guinea-Pig.
Fig. 54. *Mus Cricetus*, Hamster Rat.
Fig. 55. *Hydromys Coypus*, Coypou Rat.
Fig. 56. *Arctomys Marmota*, Alpine Marmot.
Fig. 57. *Sciurus Vulgaris*, Common Squirrel.
Fig. 58. *Myoxus Muscardinus*, Common Dormouse.
Fig. 59. *Dipus Jaculus*, Common Jerboa.

Plate CCCXI.

Fig. 60. *Lepus Timidus*, Hare sitting.
Fig. 61. *Hyrax Syriacus*, Syrian Hyrax.
Fig. 62. *Camelus Dromedarius*, Arabian Camel or Dromedary.
Fig. 63. *Moschus Moschiferus*, Tibetian Musk.
Fig. 64. *Cervus Alces*, Elk.
Fig. 65. *Camelopardalis Giraffa*, Camelopardalis or Giraffe.

Plate

Explanation of the Plates.

Plate CCCXII.

Fig. 66. *Antilope Picta*, Nyl-ghau.
Fig. 67. *Capra Ibex*, Ibex.
Fig. 68. *Ovis Argali*, Argali or Wild Sheep.
Fig. 69. *Ovis Aries*, var. Wallachian Ram.
Fig. 70. *Bos Taurus*, var. European Bison.
Fig. 71. *Bos Grunniens*, Yak of Tartary.

Plate CCCXIII.

Fig. 72. *Equus Caballus*, Horse.
Fig. 73. *Equus Asinus*, Wild Ass.
Fig. 74. *Mule.*

Explanation of the Plates.

Plate CCCXIV.

Fig. 75. *Equus Zebra*, Zebra.
Fig. 76. *Equus Quagga*, Quagga.
Fig. 77. *Hippopotamus Amphibius*, Hippopotamus, or River Horse.
Fig. 78. *Tapir Americanus*, Tapir.
Fig. 79. *Sus Scrofa*, Wild Boar.
Fig. 80. *Sus Babyrussa*, Babyroussa.

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Fig 1.

Fig 2.

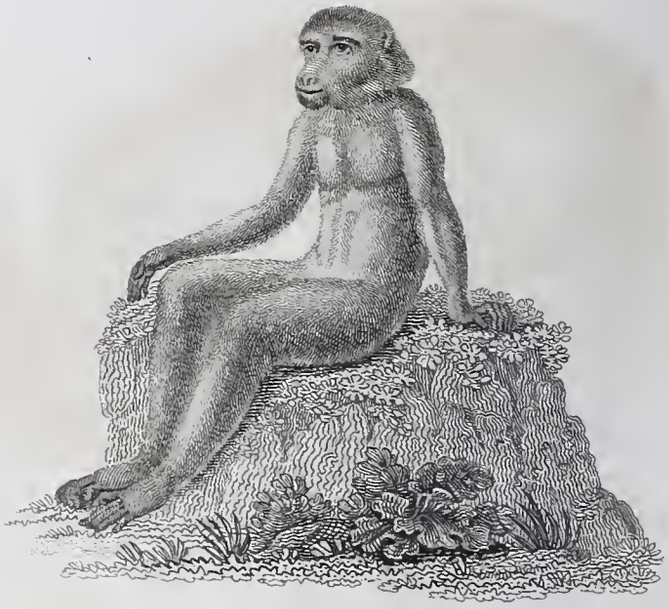


Fig. 3.

Fig. 4

Fig. 5.

Fig. 6.

A Wilson Sculp.

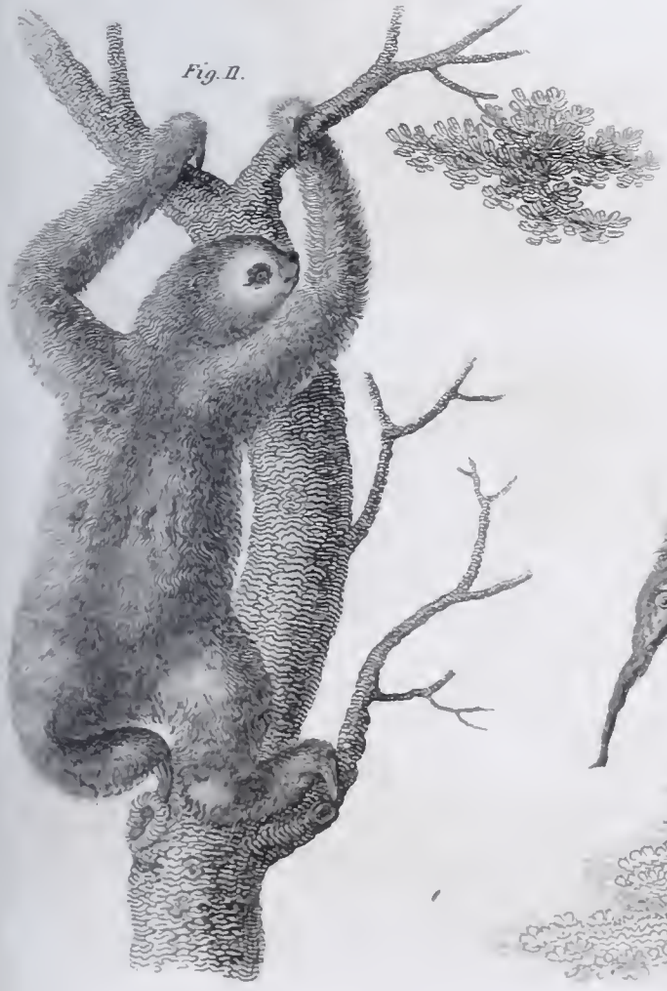
Fig. 7

Fig. 8.

Fig. 9

Fig. 10

Fig. 11.



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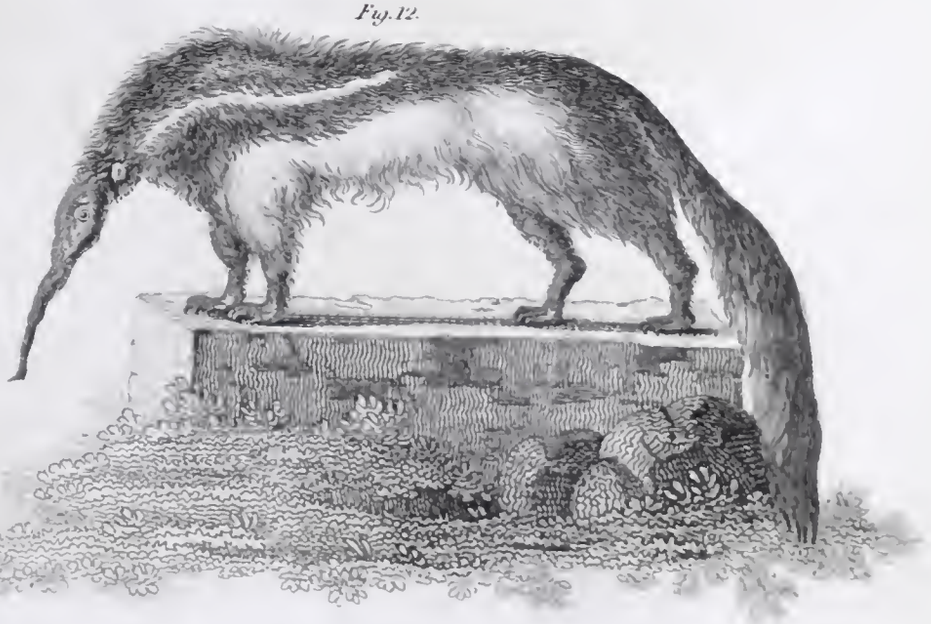

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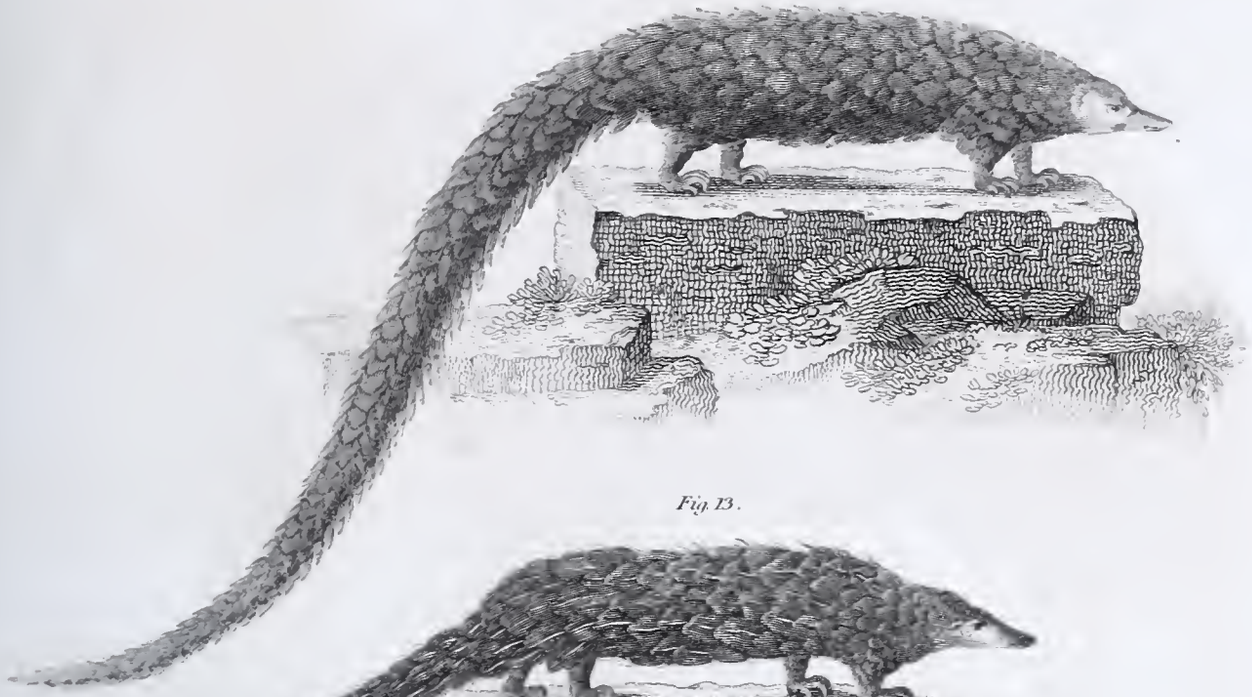

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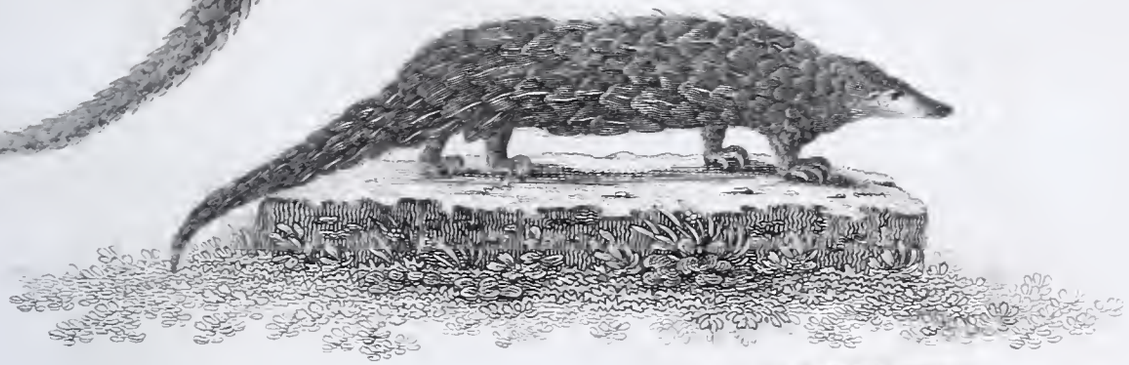

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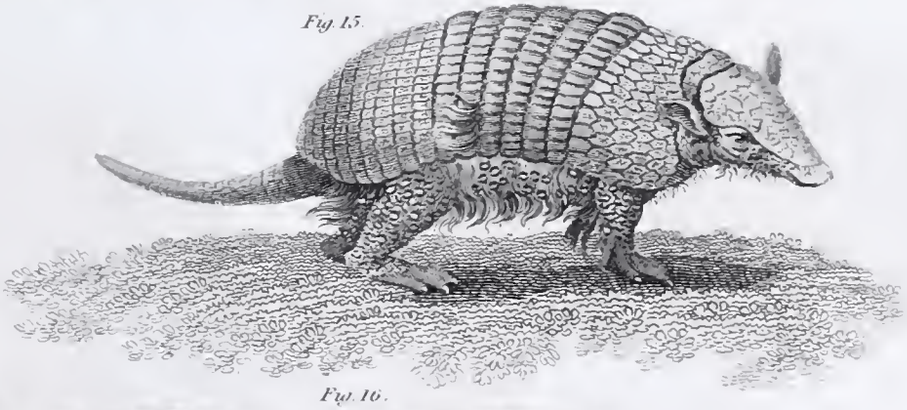
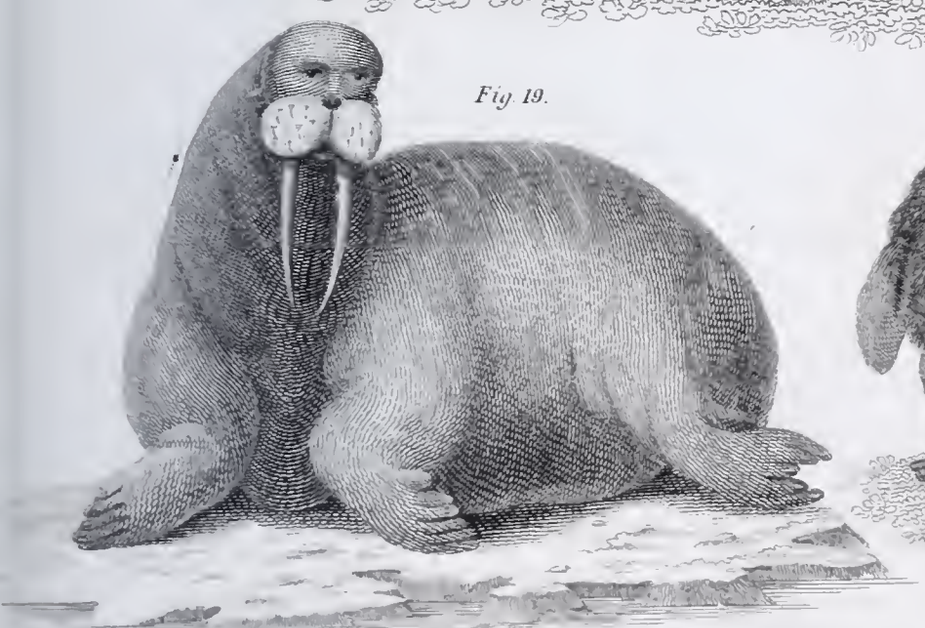


Fig 16.

Fig 17.

Fig 19.



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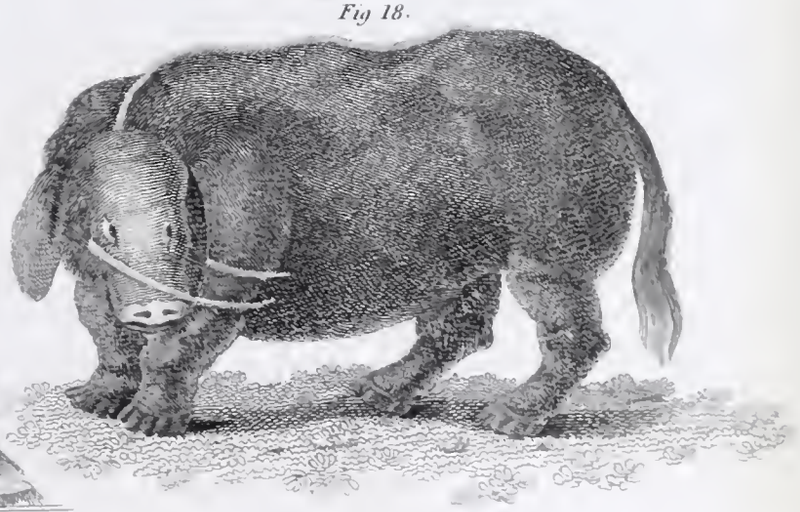

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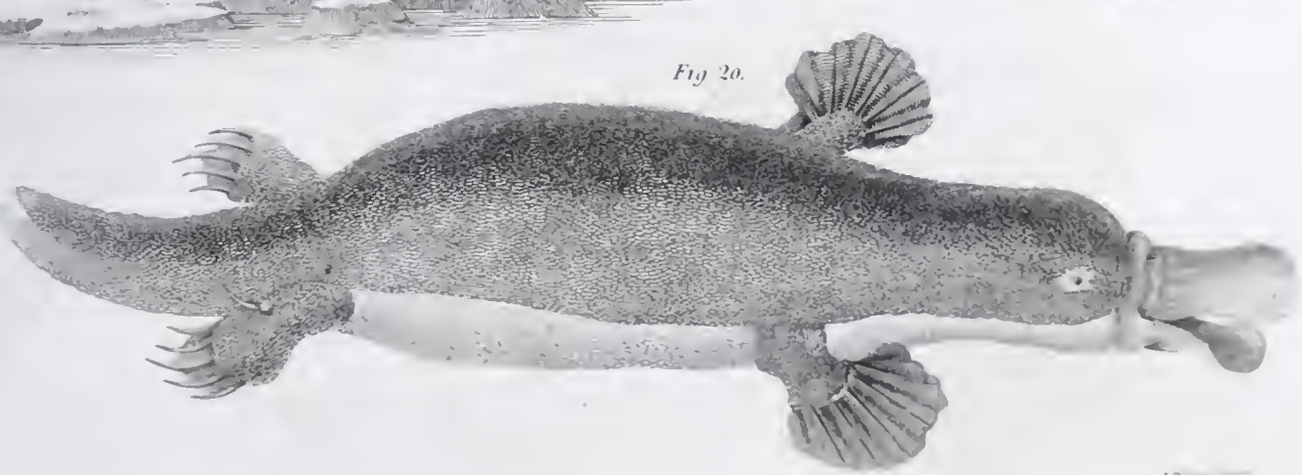

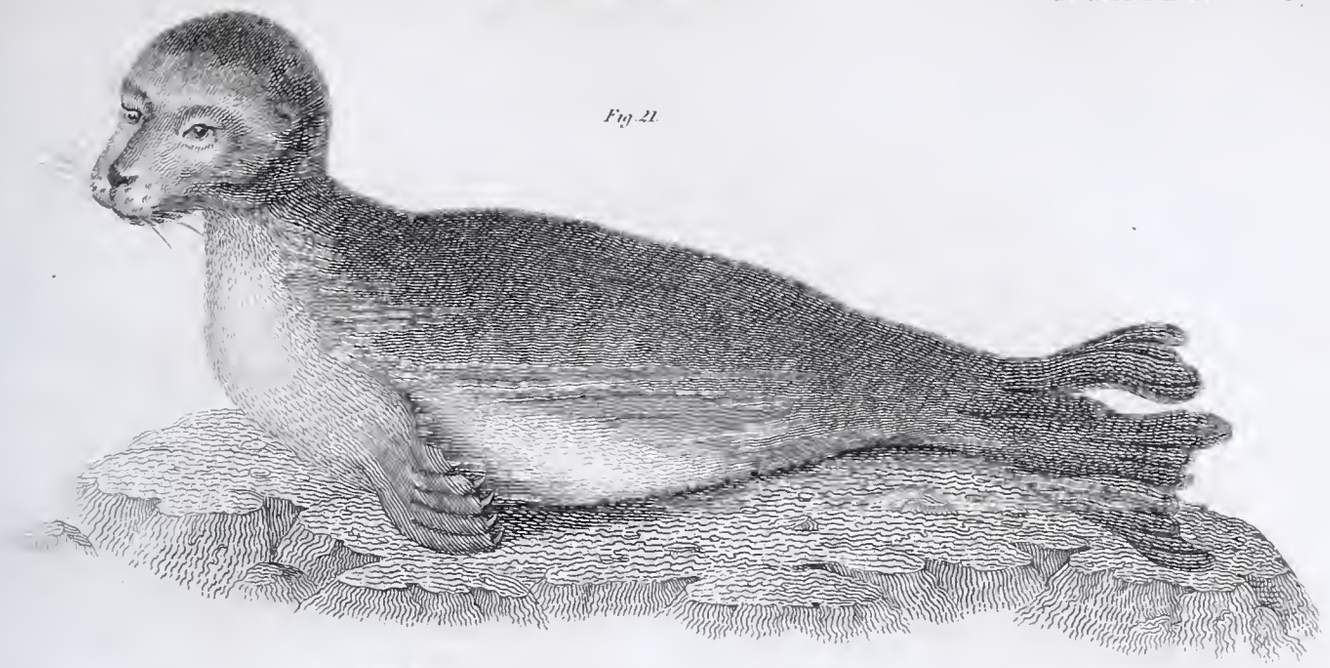

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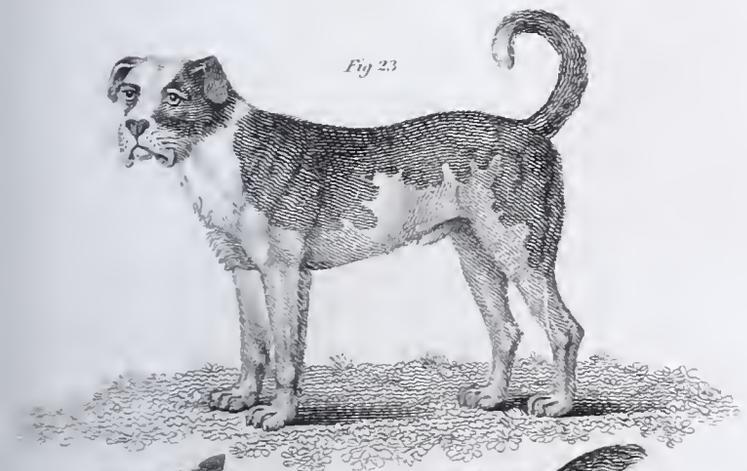

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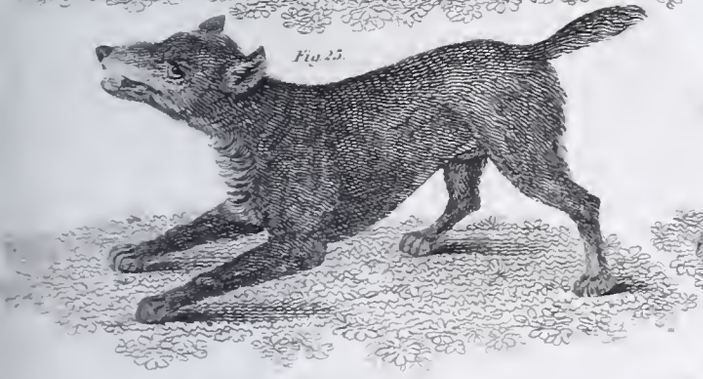

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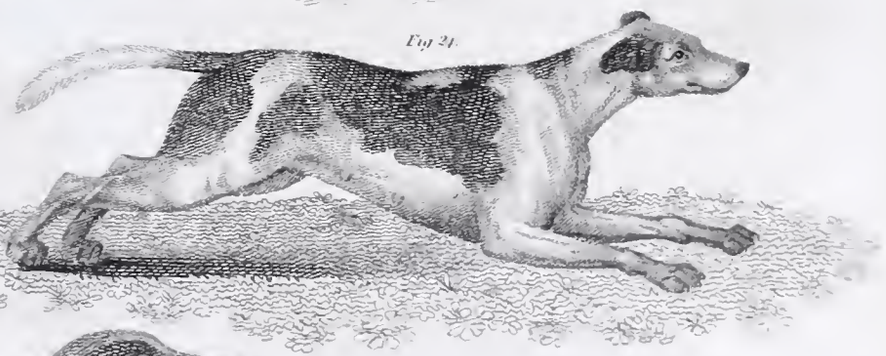

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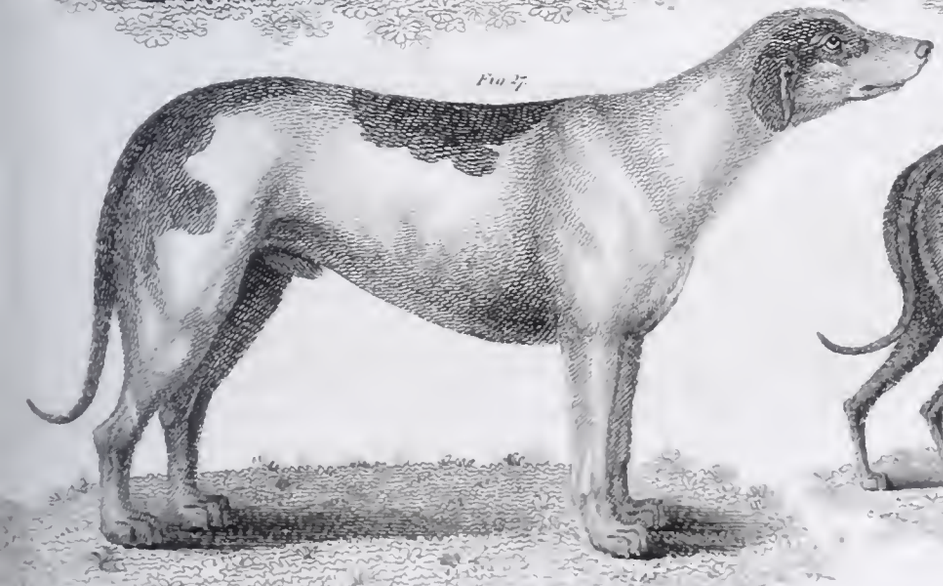
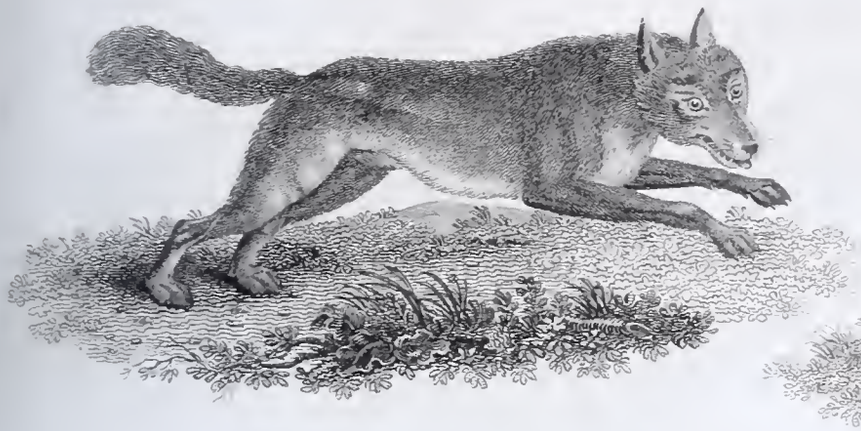


Fig 27.

Fig 26.

Whitwam Sculp.

Fig. 28.



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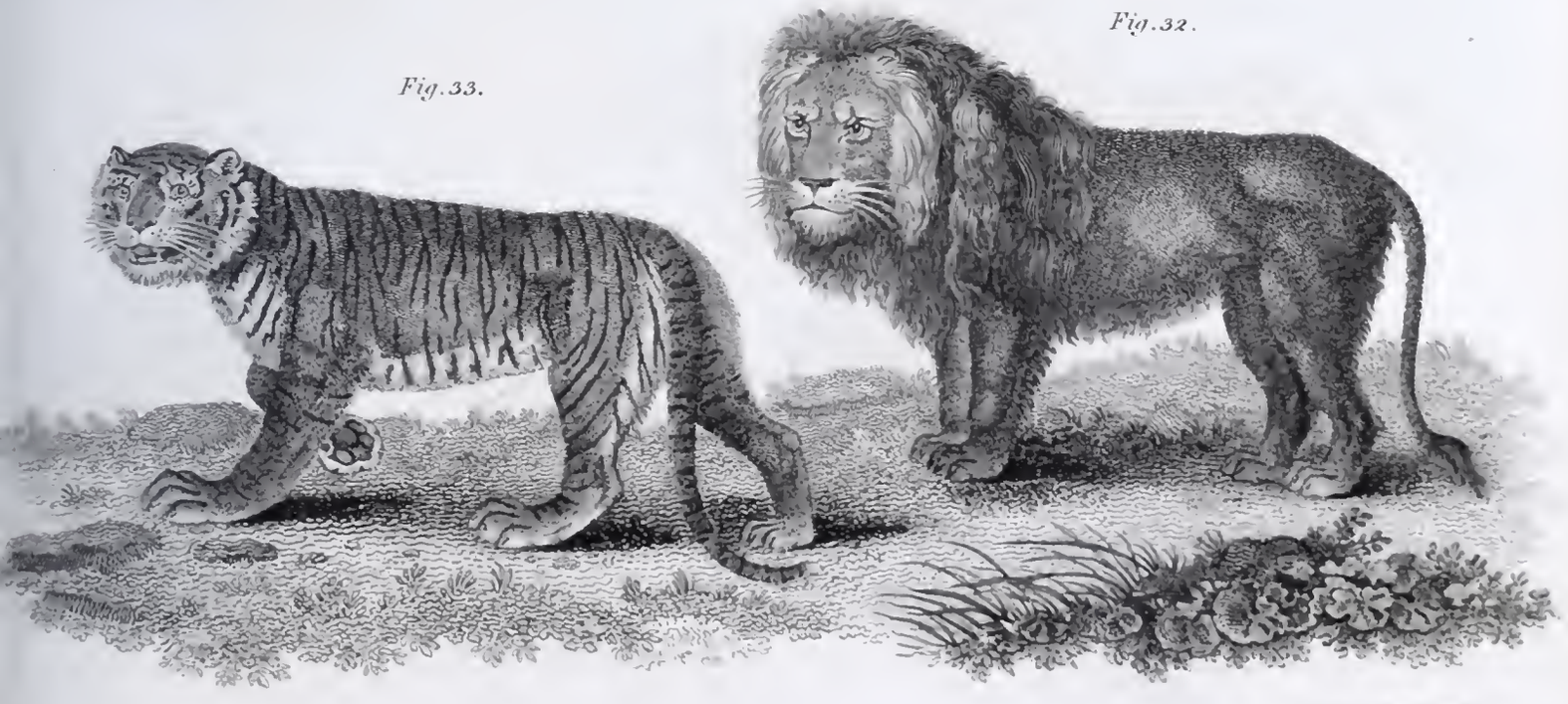

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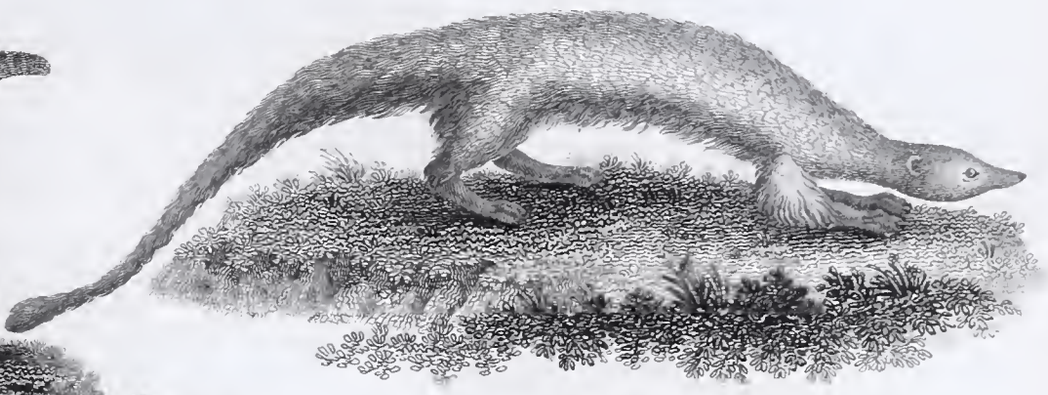

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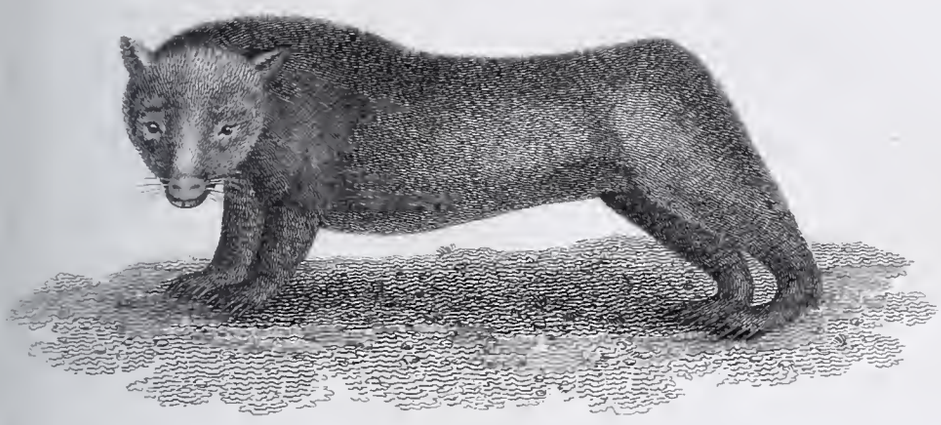

Fig. 47.

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Engd by A. D'Orbigny Rue

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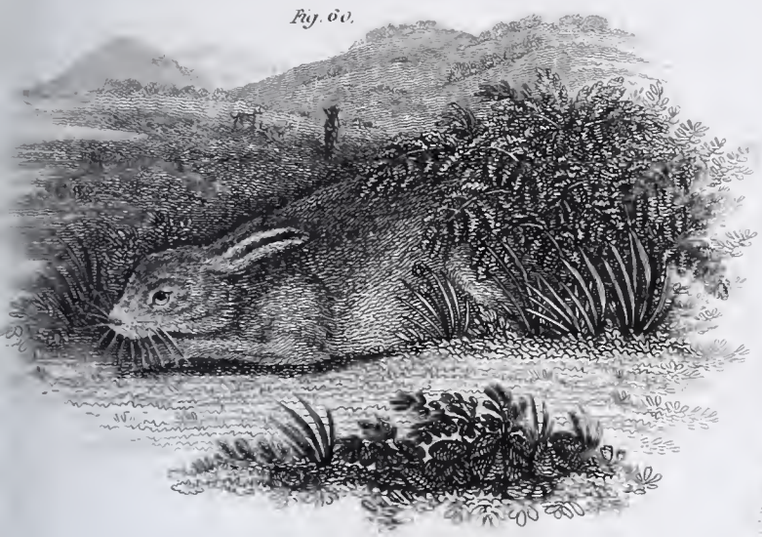

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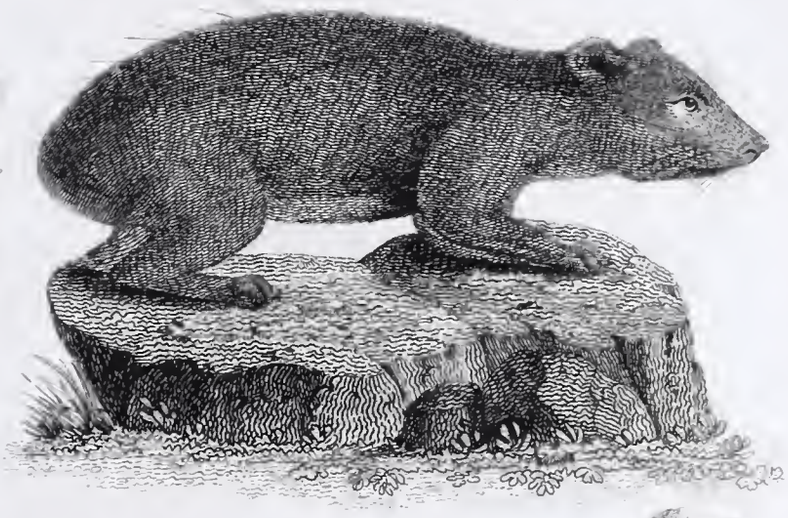

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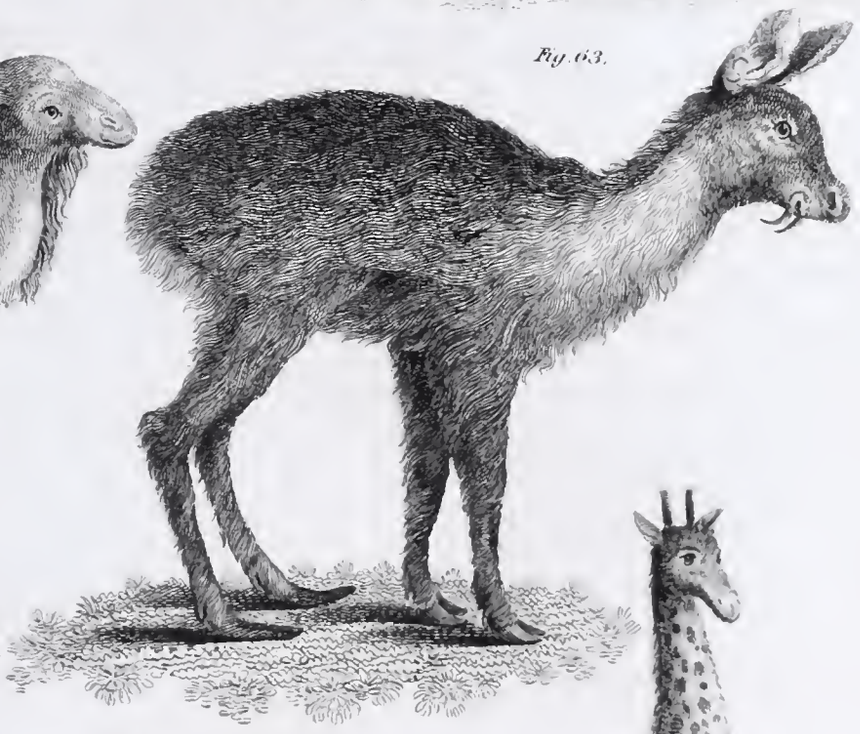

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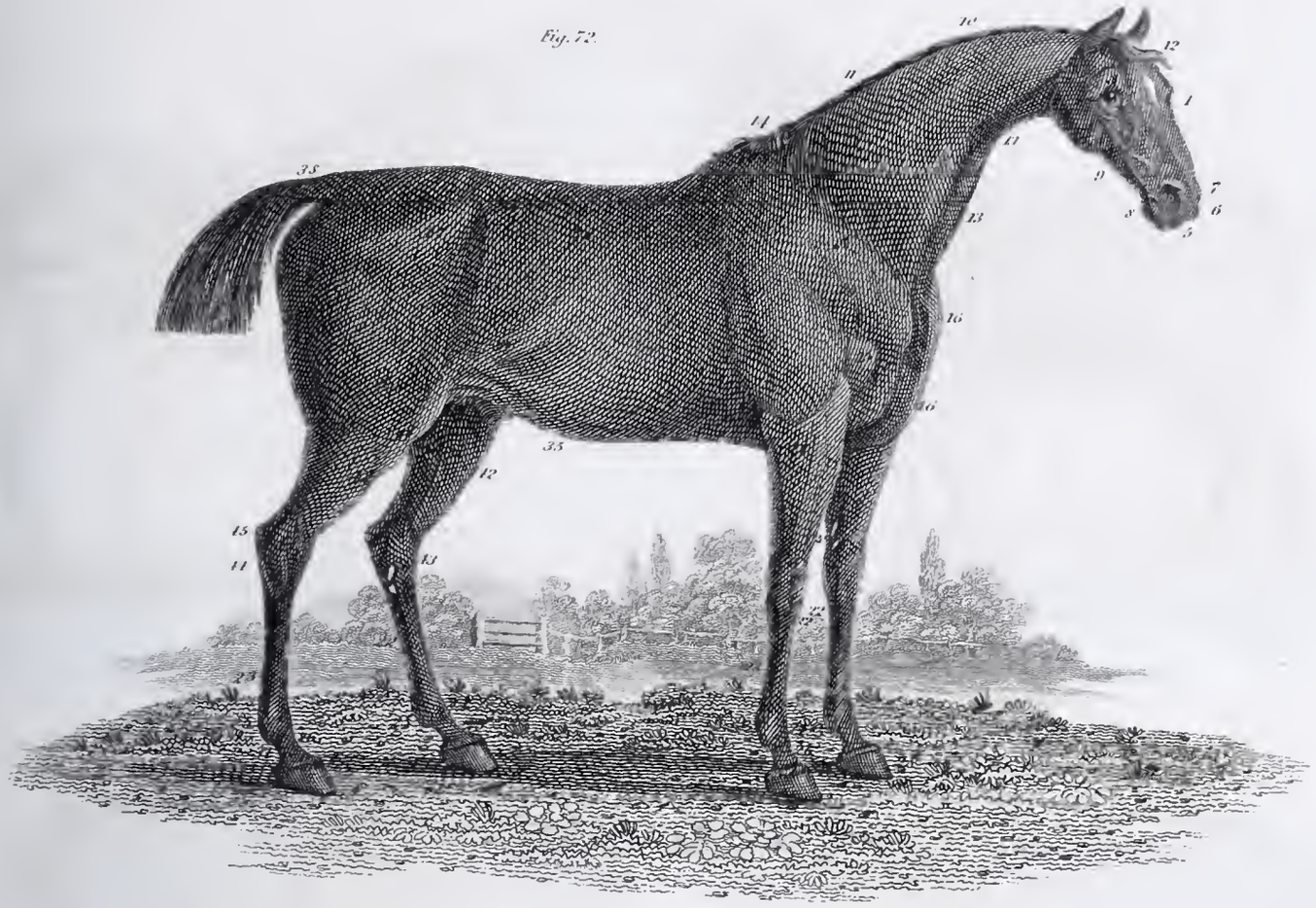

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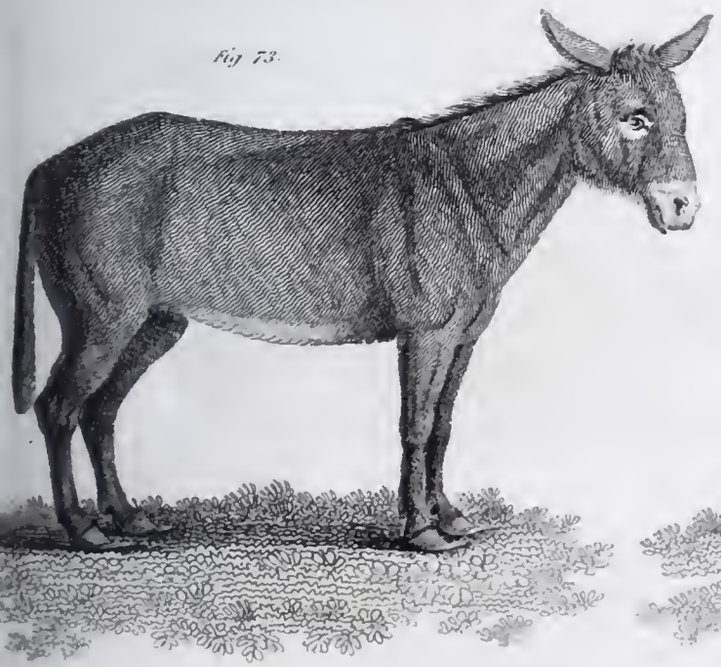

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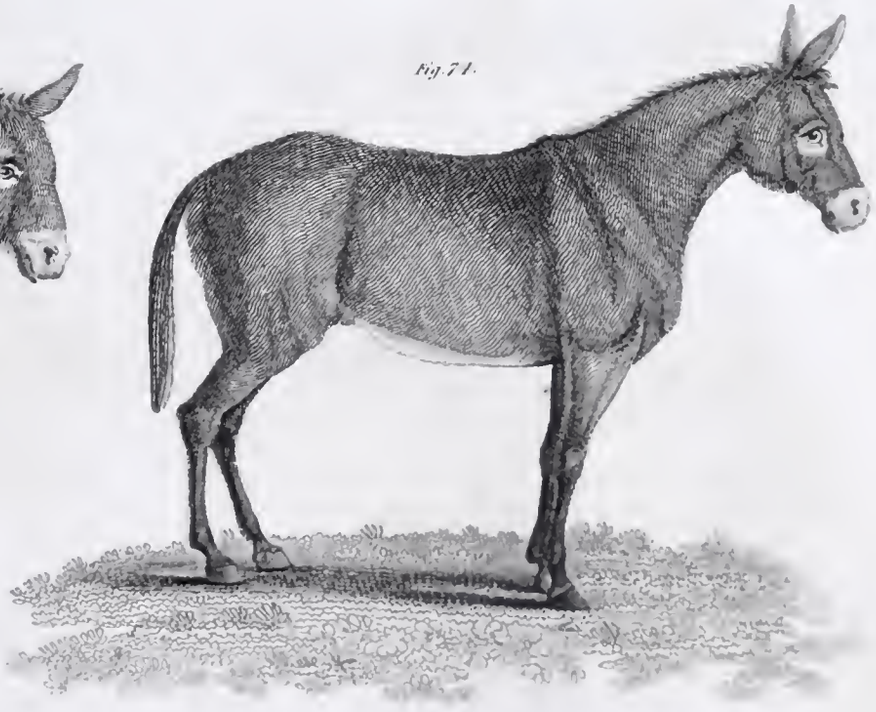

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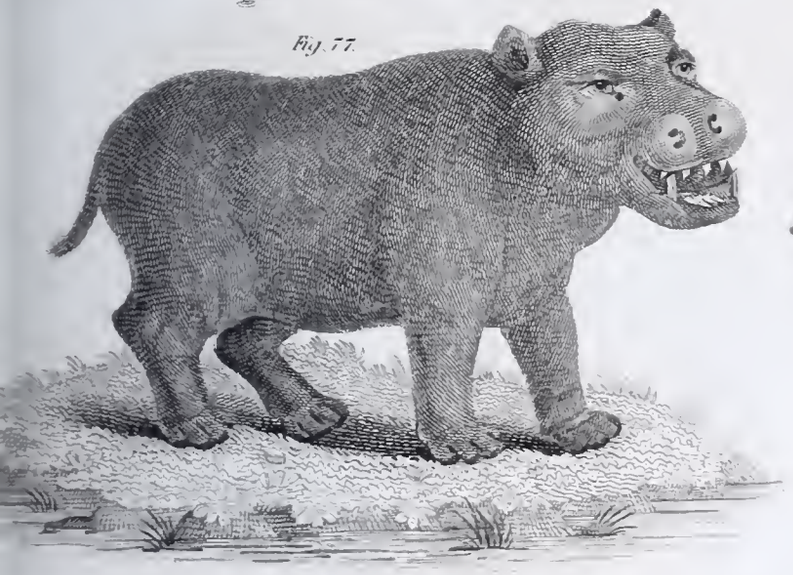

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Mammea || Mammoth

MAMMEA, *Mammee-Tree*; a genus of plants belonging to the polyandria class; and in the natural method ranking with those of which the order is doubtful. See BOTANY *Index*.

MAMMON, the god of riches, according to some authors; though others deny that the word stands for such a deity, and understand by it only *riches* themselves. Our Saviour says, We *cannot serve God and Mammon*; that is, be religious and worldly-minded at the same time. Our poet Milton, by poetic license, makes Mammon to be one of the fallen angels, and gives us his character in the following lines:

Mammon, the least erected spirit that fell
From heav'n; for ev'n in heav'n his looks and thoughts
Were always downward bent; admiring more
The riches of heav'n's pavement, trodden gold,
Than ought divine or holy else enjoy'd
In beatific vision: by him first
Man also, and by his suggestion taught,
Ransack'd the centre, and with impious hands
Rifled the bowels of their mother earth,
For treasures better hid. Soon had his crew
Open'd into the hill a spacious wound,
And digg'd out ribs of gold. Let none admire
That riches grow in hell; that soil may best
Deserve the precious bane.

MAMMOTH, or MAMMUTH, the name of a huge animal, now unknown, to which are said to have belonged those tusks, bones, and skeletons, of vast magnitude, which have been frequently found in different parts of Siberia, as well in the mountains as the valleys; likewise in Russia, Germany, and North America. Many specimens of them may be seen in the Imperial cabinet at Petersburgh; in the British, Dr Hunter's, and the late Sir Ashton Lever's museums, and in that of the Royal Society. A description of the mammoth is given by Muller in the *Recueil des Voyages au Nord*: "This animal, he says, is four or five yards high, and about 30 feet long. His colour is grayish. His head is very long, and his front very broad. On each side, precisely under the eyes, there are two horns, which he can move and cross at pleasure. In walking he has the power of extending and contracting his body to a great degree." Isbrandes-Ides gives a similar account; but he is candid enough to acknowledge, that he never knew any person who had seen the mammoth alive. Mr Pennant, however, thinks it "more than probable that it still exists in some of those remote parts of the vast new continent, impenetrated yet by Europeans. The name of Mastodon has been given by Cuvier to this fossil species. It is about the size of the elephant, and more nearly allied to that than to any other animal of the present creation. It appears to have been herbivorous. The Ohio Indians have a tradition handed down from their fathers respecting these animals, "That in ancient times a herd of them came to the Big-bone Licks, and began an universal destruction of the bears, deer, elks, buffaloes, and other animals which had been created for the use of the Indians: that the Great Man above, looking down and seeing this, was so enraged that he seized his lightning, descended to the earth, seated himself upon a neighbouring mountain on a rock, on which his seat and the print of his feet are still to be seen, and hurled his bolts among them till the whole were slaughtered, except the big bull, who, presenting his forehead to the shafts, shook them off as they fell; but at length missing one, it wounded him in the side; whereon, springing round, he bounded over the Ohio, the Wabash, the Illinois, and finally over the great lakes, where he is living at this day." See MAMMALIA *Index*.

Mammoth || Mamre.

MAMRE, an Amorite, brother of Aner and Eshcol, and friend of Abraham (Gen. xiv. 13.). It was with these three persons, together with his own and their domestics, that Abraham pursued and overcame the kings after their conquest of Sodom and Gomorrah. This Mamre, who dwelt near Hebron, communicated his name to great part of the country round about. Hence we read (chap. xiii. 18. xxiii. 17, &c.), that Abraham dwelt in Mamre and in the plain of Mamre. But it is observed, that what we translate the *plain* should be rendered the *oak*, of Mamre, because the word *elon* signifies an *oak* or *tree of a long duration*. Sozomen tells us, that this tree was still extant, and famous for pilgrimages and annual feasts, even in Constantine's time; that it was about six miles distant from Hebron; that some of the cottages which Abraham built were still standing near it; and that there was a well likewise of his digging, whereunto both Jews, Christians, and Heathens, did at certain seasons resort, either out

Manre, Man.

of devotion or for trade, because there was held a great mart. To these superstitions Constantine the Great put a stop.

1 Importance of the study of man.

MAN. Of all the objects which the universe presents to our observation, there is none that so powerfully calls for our attention, there is none with which it so much concerns us to be intimately acquainted, as the human species. If we admit, what mankind, in that pride of heart, which is so natural to those who style themselves the *lords of the creation*, have assumed, that man is the only being possessed of reason; there is no *created thing* that can in the least stand in competition with him. But, without examining into the validity of this exclusive claim, without inquiring whether some of our inferior *fellow mortals* may not be admitted to some small share of this faculty; it must be allowed that, whether we consider him as a solitary being, possessed of beauty and intelligence superior to the other classes of animated nature, or in the more amiable character of a social being, capable of the sentiments of affection, friendship, gratitude, and benevolence, man is a most distinguished personage; and, to his fellow men, certainly the most interesting object to which they can direct their attention; that in short,

"The proper study of mankind is man."

A full examination of every thing relating to the human species would include almost all that is interesting, useful, or curious in nature. Indeed this whole work is little more than a collection of facts and reasonings, that either mediately or immediately relate to MAN. It may not be improper here to refer to a few of the principal articles alluded to, before we enter on the proper business of this article, which is to state a few general circumstances relating to the *natural history* of man, considering him as the *first animal* in the creation.

2 Outline of the study of man.

First, Man may be considered *generically*; as constituting a *tribe* of animals differing from all others, in his *structure*, *functions*, *diseases*, and in possessing the *faculty of reason*.

The *structure* of man has been detailed under ANATOMY; his *functions* will be treated of under PHYSIOLOGY; the *diseases* and *accidents* to which he is exposed, with their treatment and remedies, will form the subjects of MEDICINE, MIDWIFERY, SURGERY, and MATERIA MEDICA; and the nature and exercise of his *reasoning powers* are discussed under LOGIC, METAPHYSICS, LANGUAGE, GRAMMAR, ORATORY, ARITHMETIC, ALGEBRA, GEOMETRY, &c.

Secondly, Man may be considered *specifically*, as differing from others of the same tribe in *height*, *features*, *colour*, *disposition*, and *manners*; resulting from climate and other local circumstances. In a general point of view, the varieties of the human species fall to be noticed *here*; but for a particular account of the inhabitants of different regions of the globe, we refer the reader to the geographical articles AFRICA, ASIA, AMERICA, ABYSSINIA, CEYLON, HINDOSTAN, *New* HOLLAND, &c.

Thirdly, Man may be considered as a *dependent* and an *accountable being*, in relation to his *Creator*, his *neighbour*, or *himself*. The *religious* and *moral duties* of man are explained under THEOLOGY, CHRISTIANITY, MORAL PHILOSOPHY, and LAW; and to these may be added, as connected with man in this third view, *POLITICAL Economy*, AGRICULTURE, GARDENING, ARCHITECTURE, CHEMISTRY, DYNAMICS, MECHANICS, HYDRODYNAMICS, and a number of other branches of science, that teach man how to employ to the best advantage those powers and faculties with which Heaven has endowed him, for his individual and common benefit.

Man.

Lastly, We may consider man with respect to the relations that subsist between him and the inferior classes of the creation, as they minister to his necessities, supply his wants, abridge his comforts, or oppose his progress. This consideration naturally leads us to the article NATURAL HISTORY, and its subdivisions, MAMMALIA, CETOLOGY, ERPETOLOGY, OPHIOLOGY, ORNITHOLOGY, ICHTHYOLOGY, HELMINTHOLOGY, CONCHOLOGY, BOTANY, MINERALOGY, GEOLOGY, and METEOROLOGY.

3 Writers on the natural history of man.

Of those writers who directly treat of man, the *philosopher* and the *moralist* consider him in the abstract; the *geographer* describes him as he exists in communities; the *historian* traces the origin of society, the progress of man in arts, civilization, and refinement, and the changes that have taken place among the human species, from the natural operation of physical causes, or from the folly, villany, and ambition of princes and heroes; the *biographer* treats of man as an individual, and shews the effects of exalted virtue, eminent abilities, or striking vices, both on their possessor and on the community at large. It is the business of the *naturalist* to describe the external form of man, as it differs from that of other animals; to consider the usual varieties of it in different nations, and the more striking peculiarities that are occasionally found in individuals; to describe the habits and manners of the human species; the progress of life from infancy to death; the duration of life and its causes; and the effects produced on the body by death.

Of the writers who have treated on some part of the natural history of man, we might give a most copious list, even without including the almost innumerable catalogue of medical works. For the generality of readers, it may be sufficient to refer to Buffon's Natural History, or the Abridgement of it by Goldsmith; to Virey's *Histoire Naturelle du Genre Humain*; Cuvier's *Tableau Elementaire de l'Histoire Naturelle des Animaux*; Herder's Outlines of the Philosophy of the History of Man; and the works of Daubenton, Vicq d'Azyr, Camper, Blumenbach, &c. &c.

We had proposed giving here a short popular view of the *structure* and *economy* of man; but as even this would lead us into details for which we cannot afford room, we must refer our readers to Kerr's Translation of the System of Linnæus, and Dr Hunter's Introductory Lectures to his course of Anatomy.

It is of more consequence to our present purpose to mention the particular circumstances that distinguish man from those animals to which he seems nearest allied. These distinctive marks are well described by Blumenbach, in his work *De Generis Humani Varietate Nativa*, and by M. Daubenton, in his introduction to the Dictionary of Natural History in the *Encyclopédie Methodique*; with the latter we shall present our readers.

4 Principal differences between man and apes.

The only animals that bear any striking resemblance to man, in point of structure, are the apes, especially the oran otan, and the gibbon; but according to M. Daubenton,

Man. Daubenton, there are two principal circumstances that particularly distinguish man from these animals; the first is the strength of the muscles of the legs, by which the body is supported in a vertical position above them; the second consists in the articulation of the head with the neck by the middle of its base.

We stand upright, bend our body, and walk, without thinking on the power by which we are supported in these several positions. This power resides chiefly in the muscles which constitute the principal part of the calf of the leg. Their exertion is felt, and their motion is visible externally, when we stand upright and bend our body backwards and forwards. This power is no less great when we walk even on a horizontal plane. In ascending a height, the weight of the body is more sensibly felt than in descending. All these motions are natural to man. Other animals, on the contrary, when placed on their hind legs, are either incapable of performing them at all, or do it partially, with great difficulty, and for a very short time. The *gibbon*, and the *oran otan*, can stand upright with much less difficulty than other brutes; but the restraint they are under in this attitude, plainly shews that it is not natural to them. The reason is, that the muscles in the back part of the leg in the *gibbon*, &c. are not, as in man, sufficiently large to form a calf, and consequently not sufficiently strong to support the thighs and body in a vertical line, and to preserve them in that posture. See MAMMALIA, N° 28.

M. Daubenton has discovered, that the attitudes proper to man and to other animals, are pointed out by the different ways in which the head is articulated with the neck. The two points by which the osseous part of the head is connected with the first joint of the neck, and on which every movement of the head is made with the greatest facility, are placed at the edge of the great hole of the occipital bone, which in man is situated near the centre of the base of the skull (affording a passage for the medullary substance into the vertebral canal,) as upon a pivot or point of support. The face is on a vertical line, almost parallel to that of the body and neck. The jaws, which are very short when compared with those of most other animals, extend very little farther forwards than the forehead. No animal has, like man, its hind legs as long as the body, neck, and head, taken together, measuring from the top of head to the os pubis.

5 Difference between man and quadrupeds in general. In the frame of the human body the principal parts are nearly the same with those of other animals; but in the connection and form of the bones there is as great a difference as in the attitudes proper to each. Were a man to assume the natural posture of quadrupeds, and try to walk by the help of his hands and feet, he would find himself in a very unnatural situation; he could not move his feet and hands but with the greatest difficulty and pain; and let him make what exertions he pleased, he would find it impossible to attain a steady and continued pace. The principal obstacles he would meet with would arise from the structure of the pelvis, the hands, the feet, and the head.

The plane of the great occipital hole, which in man is almost horizontal, puts the head in a kind of equilibrium upon the neck when we stand erect in our natural attitude; but when we are in the attitude of quadrupeds, it prevents us from raising our head so as to look forwards, because the movement of the head is stopt by the protuberance of the occiput, which then approaches too near the vertebræ of the neck. Man.

In most animals, the great hole of the occipital bone is situated at the back part of the head; the jaws are very long; the occiput has no protuberance beyond the aperture, the plane of which is in a vertical direction, or inclined a little forwards or backwards; so that the head is pendent, and joined to the neck by its posterior part. This position of the head enables quadrupeds, though their bodies are in a horizontal direction, to present their muzzle forwards, and to raise it so as to reach above them, or to touch the earth with the extremity of their jaws when they bring their neck and head down to their feet. In the attitude of quadrupeds, man could touch the earth only with the fore part or the top of the head.

6 Man could never be a quadruped. To these differences of structure, we may add, that when man is standing, his heel rests upon the earth as well as the other parts of his foot; when he walks it is the first part that touches the ground; man can stand on one foot: these are peculiarities in structure and in the manner of moving which are not to be found in other animals. We may therefore conclude that man cannot be ranked in the class of quadrupeds. We may add, that in man the brain is much larger, and the jaws much shorter, than in any other animal. The brain, by its great extent, forms the protuberance of the occipital bone, the fore head, and all that part of the head which is above the ears. In the inferior animals, the brain is so small, that most of them have no occiput, and the front is either wanting or little raised. In animals which have large foreheads, such as the horse, the ox, the elephant, &c. they are placed as low as the ears, and even lower. These animals likewise want the occiput, and the top of the head is of very small extent. The jaws, which form the greatest portion of the muzzle, are large in proportion to the smallness of the brain. The length of the muzzle varies in different animals; in solipede animals it is very long; it is short in the orau otan, and in man it does not exist at all; no beard grows on the muzzle; this part is wanting in every animal *.

* *Daubenton.*

Man then alone, of all the animals with which we are acquainted, can constantly and uniformly support himself in the erect posture; and whatever the ingenious and learned writer of Ancient Metaphysics has advanced in favour of so strange a hypothesis, we cannot believe that even in his earliest and rudest state of civilization man could ever have been a quadruped. We are aware that Kotzebue, in the entertaining work in which he relates his exile to Siberia, speaks of an idiot he saw on his return, that went on all fours, with as much ease as if it were his natural attitude, but we do not consider this single instance as affording a proof that such would be the attitude of man in a state of nature.

"There are (says Cuvier) several circumstances in the anatomical structure of man, which sufficiently prove that nature never intended him to walk on all fours. In this situation his eyes would be directed towards the earth; but not being possessed of the cervical ligament that is found in quadrupeds, he would not be able to support his head. His inferior extremities would be too much elevated in proportion to his arms, and his feet too

short

Man. short to enable him conveniently to bend them like other animals who tread only on their toes. His chest is so large that it would impede the free motion of his arms. He could not even climb with so much facility as apes, because he has not, like them, the great toe separated from the rest; nor could he climb like the cats, on account of the weakness of his nails *."

* *Tableau Elementaire.*

The body of a well-shaped man ought to be square, the muscles ought to be strongly marked, the contour of the members boldly delineated, and the features of the face well defined. In women, all the parts are more rounded and softer, the features are more delicate, and the complexion brighter. To man belong strength and majesty: gracefulness and beauty are the portions of the other sex. The structure essential to each will be found in the description of the human skeleton, under the article ANATOMY. See also ANATOMY, ANIMAL, SUPPLEMENT.

7 Nobleness of the form and attitude of man.

Every thing in both sexes points them out as the sovereigns of the earth; even the external appearance of man declares his superiority to other creatures. His body is erect; his attitude is that of command; his august countenance, which is turned towards heaven, bears the impressions of his dignity. The image of his soul is painted in his face; the excellence of his nature pierces through the material organs, and gives a fire and animation to the features of his countenance. His majestic deportment, his firm and emboldened gait, announce the nobleness of his rank. He touches the earth only with his extremity, he views it only at a distance, and seems to despise it. It has been justly observed, that the countenance of man is the mirror of his mind. In the looks of no animal are the expressions of passions painted with such energy and rapidity, and with such gentle gradations and shades, as in those of man. We know, that in certain emotions of the mind, the blood rises to the face, and produces blushing; and that in others the countenance turns pale. These two symptoms, the appearance of which depends on the structure and the transparency of the reticulum, especially redness, constitute a peculiar beauty. In our climates, the natural colour of the face of a man in good health is white, with a lively red suffused upon the cheeks. Paleness of the countenance is always a suspicious symptom. That colour which is shaded with black is a sign of melancholy; and constant and universal redness is a proof that the blood is carried with too much impetuosity to the brain. A livid colour is a morbid and dangerous symptom; and that which has a tint of yellow is a sign of jaundice or repletion of bile. The colour of the skin is frequently altered by want of sleep or of nourishment, or by looseness and diarrhœa†.

† *Buffon.*

8 Diversity of the human features.

Notwithstanding the general similitude of countenance in nations and families, there is a wonderful diversity of features. No one, however, is at a loss to recollect the person to whom he intends to speak, provided he has once fully seen him. One man has liveliness and gaiety painted in his countenance, and announces beforehand, by the cheerfulness of his appearance, the character which he is to support in society. The tears which bedew the cheeks of another man would excite compassion in the most unfeeling heart. Thus the face of man is the rendezvous of the symptoms both of his moral and physical affections; tranquillity, anger, threatening, joy, smiles, laughter, malice, love, envy, jealousy, pride, contempt, disdain or indignation, irony, arrogance, tears, terror, astonishment, horror, fear, shame or humiliation, sorrow and affliction, compassion, meditation, particular convulsions, sleep, death, &c. &c. The difference of these characters appears to us of sufficient importance to form a principal article in the natural history of man. Man.

9 General analysis of the features.

When the mind is at ease, all the features of the face are in a state of profound tranquillity. Their proportion, harmony, and union, point out the serenity of the thoughts. But when the soul is agitated, the human face becomes a living canvas, whereon the passions are represented with equal delicacy and energy; where every emotion of the soul is expressed by some feature, and every action by some mark; the lively impression of which anticipates the will, and reveals by pathetic signs our secret agitation, and those intentions which we are anxious to conceal. It is in the eyes that the soul is painted in the strongest colours, and with the nicest shades. The different colours of the eyes are, dark hazel, light hazel, green, blue, gray, and whitish gray. The most common of these colours are hazel and blue, both of which are often found in the same eye. Eyes which are commonly called black, are only dark hazel; they appear black in consequence of being contrasted with the white of the eye. Wherever there is a tint of blue, however slight, it becomes the prevailing colour, and outshines the hazel, with which it is intermixed, to such a degree, that the mixture cannot be perceived without a very narrow examination. The most beautiful eyes are those which appear black or blue. In the former there is more expression and vivacity; in the latter more sweetness, and perhaps delicacy.

10 The eyes.

11 The eyebrows.

Next to the eyes, the parts of the face by which the physiognomy is most strongly marked, are the eyebrows. Being of a different nature from the other parts, their effect is increased by contrast. They are like shade in a picture, which gives relief to the other colours and forms.

12 The forehead.

The forehead is one of the largest parts of the face, and one that contributes most to its beauty. Every body knows of how great importance the hair is in the physiognomy, and that baldness is a very great defect. When old age begins to make its approaches, the hair which first falls off is that which covers the crown of the head and the parts above the temples. We seldom see the hair of the lower part of the temples, or of the back of the head, completely fall off. Baldness is peculiar to men; women do not naturally lose their hair, though it becomes white as well as that of men at the approach of old age.

13 The nose.

The nose is the most prominent feature of the face; but as it has very little motion, and that only in the most violent passions, it contributes less to the expression than to the beauty of the countenance. The nose is seldom perpendicular to the middle of the face, but for the most part is turned toward the one side or the other. The cause of this irregularity, which, according to painters, is perfectly consistent with beauty, and of which even the want would be a deformity, appears to be frequent pressure on one side of the cartilage of the child's nose against the breast of the mother when

it

Man. it receives suck. At the early period of life the cartilages and bones have acquired very little solidity, and are easily bent.

14 Mouth and lips. Next to the eyes, the mouth and lips have the greatest motion and expression. The motions of these parts are under the influence of the passions. The mouth, set off by the vermilion of the lips, and the enamel of the teeth, marks, by the various forms it assumes, their different characters; and this feature receives animation from the organ of the voice, which communicates to it more life and expression than is possessed by any other feature. The cheeks are uniform features, and have no motion, and little expression, except what arises from that involuntary redness or paleness with which they are covered in different passions, such as shame, anger, pride, and joy, producing redness; and fear, terrow, and sorrow, producing paleness.

15 Changes on the features by the passions. In different passions, the whole head assumes different positions, and is affected with different motions. It hangs forward during shame, humility, and sorrow; it inclines to one side in languor and compassion; it is elevated in pride, erect and fixed in obstinacy and self-conceit. In astonishment, it is thrown backwards; and it moves from side to side in contempt, ridicule, anger, and indignation. In grief, joy, love, shame, and compassion, the eyes swell and the tears flow. The effusion of tears is always accompanied with an extension of the muscles of the face, which opens the mouth. In sorrow, the corners of the mouth are depressed, the under-lip rises, the eyelids fall down, the pupil of the eye is round and half concealed by the eyelid. The other muscles of the face are relaxed, so that the distance between the eyes and the mouth is greater than ordinary; and consequently the countenance appears to be lengthened. In fear, terror, consternation, and horror, the forehead is wrinkled, the eyebrows are raised, the eyelids are opened as wide as possible, the upper lid uncovers a part of the white above the pupil, which is depressed and partly concealed by the under lid. At the same time the mouth opens wide, the lips recede from each other, and discover the teeth both above and below. In contempt and derision, the upper lip is raised to one side and exposes the teeth, while the other side of the lip moves a little, and wears the appearance of a smile. The nostril on the elevated side of the lip shrivels up, and the corner of the mouth falls down. The eye on the same side is almost shut, while the other is open as usual; but the pupils of both are depressed, as when one looks down from a height. In jealousy, envy, and malice, the eyebrows fall down and are depressed. The upper lip is elevated on both sides, while the corners of the mouth are a little depressed, and the under lip rises to join the middle of the upper. In laughter the corners of the mouth are drawn back, and a little elevated; the upper parts of the cheeks rise; the eyes are more or less closed; the upper lip rises, and the under one falls down; the mouth opens, and in cases of immoderate laughter, the skin of the nose wrinkles. That gentler and more gracious kind of laughter which is called *smiling*, is seated wholly in the parts of the mouth. The under lip rises; the angles of the mouth are drawn back, the cheeks are puffed up, the eyelids approach one another, and a small twinkling is observed in the eyes. It is very extraordinary, that laughter may be excited either by a moral cause without the immediate action of external objects, or by a particular irritation of the nerves without any feeling of joy. Thus an involuntary laugh is excited by a slight tickling of the lips, of the palm of the hand, of the sole of the foot, of the armpits, and in short, below the middle of the ribs. We laugh when two dissimilar ideas, the union of which was unexpected, are represented to the mind at the same time, and when one or both of these ideas, or their union, includes some absurdity which excites an emotion of disdain mingled with joy. In general, striking contrasts never fail to produce laughter. Man.

A change is produced in the features of the countenance by weeping as well as by laughing. In weeping, the under lip is separated from the teeth; the forehead is wrinkled; the eyebrows are depressed; the dimple which gives a gracefulness to laughter, forsakes the cheek; the eyes are unusually compressed, and bathed in tears. In laughter, tears not unfrequently appear, but they flow more seldom and less copiously.

The arms, hands, and every part of the body, contribute to the expression of the passions. In joy, for instance, all the members of the body are agitated with quick and varied motions. In languor and sorrow, the arms hang down, and the whole body remains fixed and immoveable. In admiration and surprise, a similar suspension of motion is likewise observed. In love and hope, the head and eyes are raised to heaven, as if to solicit the wished-for good; the body bears forward as if to approach it; the arms are stretched out, and seem to seize before hand the desired object. On the contrary, in fear, hatred, and horror, the arms seem to push backward, and repel the object of aversion. We turn away our head and eyes, as if to avoid the sight of it; we start back as if to shun it *. * *Buffon.*

For the *beauty* of the human form, see BEAUTY and DRAWING.

16 Origin of family affection; At his birth, man is the most feeble of all animals; he cannot subsist but by the care of his parents, for which he has occasion for a much longer time than other animals. Hence the natural continuance of conjugal affection, and the intimate ties that bind together the parents with each other and with their children. As the father partakes with his companion in the care of educating their children, man ought more than any other animal, to live in a state of monogamy, the propriety of which is demonstrated by the nearly equal number of male and female children that on an average come into the world.

17 and of social intercourse. Man is formed for society, which is rendered essentially necessary to him from his natural weakness, and without which he would not be able to resist the wild beasts of the forest, nor procure for himself the necessaries of life: for he has no arms offensive or defensive, such as horns, claws, scales; nor any thing that resembles that faculty which we call instinct, which many species of animals derive from nature herself, and by which they construct themselves habitations, or change their climate, according to the diversity of the seasons.

18 Of language and arts. All gregarious animals have a certain language by which they can in some measure communicate their thoughts to each other; but man enjoys in this respect two remarkable prerogatives. 1. The faculty of articulating sounds, which no quadruped enjoys in common with him, and which must give to his language an infinite

Man.

finite variety and precision. 2. An unlimited power of generalizing his ideas, and of fixing and retaining abstract notions by means of words. On this depend memory and judgment, which latter is the foundation of reason, or of that faculty of reflecting and combining ideas, which is considered as peculiar to man.

It is by means of language than man communicates to the rest of his species the observations and discoveries made by each individual, and this communication is the great source of the infinite perfectibility of the human race. The arts are the offspring of science, produced by the combination of these observations and discoveries, and by that address which results from the peculiar conformation of our hands and fingers.

By means of the arts man has learned to procure for himself subsistence, and to provide against the inclemencies of the weather in every climate of the earth. Thus, he has established himself every where; while the rest of the animal creation have each a determinate space, beyond which they cannot pass without the protection of man, who has transported with him the domestic kinds, and has been followed in spite of himself by the parasitical tribes.

19 Progress of civilization.

The nations who established themselves in the icy regions of the north, not finding there enough of vegetable nourishment, nor pasture sufficiently abundant for cattle, derived all their subsistence from the chase or fishing. Obliged to devote all their time to the procuring of this subsistence, and multiplying but slowly, from the destruction of the game which surrounded them, it is not surprising that among them man has made least progress in arts and civilization. Their arts were confined to the construction of huts, to the preparing of skins for their covering, and to the manufacture of spears and arrows. The inhabitants of the northern and eastern parts of Siberia, and the savages of North America, are almost the only people who are in this low state of civilization.

Other nations learned to secure for themselves in the possession of numerous herds, certain subsistence, and to find sufficient leisure to increase their knowledge; but their wandering life, in search of new pastures and more agreeable climates, kept them still within very narrow limits with respect to civilization. They, however, acquired more industry in the construction of their habitations, and learned the value of property; the natural consequences of which were riches, and an inequality of condition. The Laplanders in the north of Europe, the Tartars who inhabit the vast extent of country in the interior of Asia; the Bedouin Arabs who occupy the sands of Arabia and the north of Africa, the Caffres and Hottentots in the south of Africa, are the principal wandering tribes with which we are acquainted.

Man did not multiply to any great extent, nor rise to any great perfection in the arts and sciences, till landed property allowed him to pay attention to agriculture, by means of which the labour of one part of the community could procure subsistence for the rest, and leave them sufficient leisure to employ themselves in arts less necessary than ornamental. Lastly, The invention of money, by facilitating the transfer of commodities, brought to the highest pitch industry, luxury, and inequality of fortune, and by a necessary consequence, the vices of effeminacy, and the rage of ambition.

Man.

Man living in every climate, fearing no other animal, but having even destroyed or confined to the deserts all those who could molest him, became incomparably more numerous than any other tribe of large animals. Hence, having few other animals to combat, he soon began to make war on his own species, and he may be considered as almost the only animal that is perpetually at war with those of the same tribe. Savages dispute the forests in which they follow the chase; Nomads, the pastures where they feed their cattle; more civilized people combat for the monopoly of commerce or the prerogatives of pride and ambition. Hence the necessity of government, to regulate national disputes, and to reduce to certain rules the quarrels of individuals *.

* *Cuvier.*

20 Marks that distinguish varieties of the human species.

It is chiefly the features of the countenance, and the colour of the skin, that serve to distinguish the varieties of the human species. Independently of particular and individual differences, the human race may be distinguished into five principal varieties, the distinctive characters of which are deeply stamped, and appear to resist even the powerful influence of climate. In fact we see, under the same parallel of latitude, and in the same country, existing together for a number of ages, the dark Hungarian or gypsy, and the fairest people of Europe; the copper-coloured Peruvian, the brown Malay, and the almost white Abyssinian, in the same zone that is inhabited by the blackest people in the universe. The inhabitants of Van Diemen's land are black, while the Europeans of the same degree of north latitude are white; and the inhabitants of the Malabar coast, though placed beneath a sky much hotter than the inhabitants of Siberia, are not browner than these latter. The Dutch who colonized the Cape of Good Hope, have not, during two centuries, acquired the same colour with the Hottentots who people that country; and the Parsi remain white in the midst of the olive-coloured Hindoos.

The colouring matter seated in the mucous membrane below the skin, is not the only distinctive character that marks the varieties of the human species, as in each of them there is a peculiar form, distinguished by general and constant marks, depending on the conformation of the bones. The muzzle of the Negro; the very prominent cheek-bones of the Calmuck; the flattened skull and nose of the Caribbee Indian; the oblique eyes of the Japanese and Chinese, do not appear owing to art, like the lengthened ears or the tattooed skin of the natives of the South sea islands. The fair or red colour of the hair in Europeans; the blue or gray eyes of the north, are almost never seen, except in a few morbid cases, in any other varieties. The hair of all the rest is very black, even from infancy; sleek and thick in all the Mogul nations, the Malays, and the Americans, both of the south and north, but woolly in Negroes and Hottentots; the beard which is late and thin in all the Monguls, exists naturally throughout the American tribes, though, as among most other savage people, all the Caribs eradicate it from their youth, which has induced a supposition that all these savage people are naturally beardless †.

† *Virey.*

Mankind with respect to their varieties, have been very

Man. very differently divided by naturalists. Linnæus makes five varieties, viz. 1. *Americans*, of copper-coloured complexion, choleric constitution, and remarkably erect. 2. *Europeans;* of fair complexion, sanguine temperament, and brawny form. 3. *Asiatics;* of sooty complexion, melancholic temperament, and rigid fibre. 4. *Africans;* of black complexion, phlegmatic temperament, and relaxed fibre; and, 5. *Monsters;* comprehending, 1. *Alpini;* the inhabitants of the northern mountains: they are small in stature, active, and timid in their disposition. 2. *Patagonici;* the Patagonians of South America, of vast size, and indolent in their manners. 3. *Monorchides;* the Hottentots, having one testicle extirpated. 4. *Imberbes;* most of the American nations, who eradicate their beards and the hair from every part of the body except the scalp. 5. *Macrocephali.* 6. *Plagiocephali;* the Canadian Indians, who have the fore part of their heads flattened, when young, by compression.

21 Varieties of man as stated by Linnæus.

22 By Gmelin. The following arraugement of the varietics in the human species, is offered by Gmelin as more convenient than that of Linnæus. 1. White, (*Hom. Albus.*) Formed by the rules of symmetrical elegance and beauty: or at least what we consider as such.—This division includes almost all the inhabitants of Europe; thosc of Asia on this side of the Oby, the Caspian, Mount Imaus, and the Ganges; likewise the natives of the north of Africa, of Greenland, and the Esquimaux.

2. Brown: (*Hom. Badius.*) Of a yellowish brown colour; has scanty hairs, flat features, and small eyes.—This variety takes in the whole inhabitants of Asia not included in the preceding division.

3. Black: (*Hom. Niger.*) Of black complexion; has frizzly hair, a flat nose, and thick lips.—The whole inhabitants of Africa, excepting those of its more northern parts.

4. Copper-coloured: (*Hom. Cupreus.*) The complexion of the skin resembles the colour of copper not burnished.—The whole inhabitants of America, except the Greenlanders and Esquimaux.

5. Tawney: (*Hom. Fuscus.*) Chiefly of a dark blackish-brown colour; having a hroad nose, and harsh coarse straight hair.—The inhabitants of the southern islands, and of most of the Indian islands.

23 By Buffon. Buffon enumerates six varieties, 1. The polar or Lapland race; 2. The Tartar or Mongul; 3. The southern Asiatic; 4. The European; 5. The Ethiopian; and, 6. The American. For an account of these varieties see Buffon's Natural History by Smellie, and Herder's Outlines of the Philosophy of the History of Man.

24 By Virey. Virey the disciple of Buffon, distributes man into five varieties, 1. The Celtic race, containing most of the Europeans. 2. The Mongul and Lapland. 3. Malay. 4. The Negro and Hottentot; and, 5. The Carrib. For his description of these varieties, with portraits illustrating them, see his *Histoire Naturelle du Genre Humain*, tom. i. p. 129.

25 By Cuvier. Of all the divisions which we have seen, we consider that given by Cuvier, in his *Tableau Elementaire de l'Histoire Naturelle des Animaux*, as the least exceptionable; and as it is very concise, we shall here give a translation of it. Cuvier's enumeration is as follows:

26 White race. 1. The *white race*, with oval visage, long hair, pointed nose; to which belong the polished natives of Europe, which appears to us the most comely of all the varieties, is also far superior to the rest in strength of genius, in courage, and activity. The Tartars, properly so called, from whom the Turks are descended; the Circassians, and other people about Mount Caucasus, who are the fairest of the human race: the Persians, the native inhabitants of Hindostan, the Arabians, the Moors who inhabit the north of Africa, and the Abyssinians, who appear, as well as the Jews, to be derived from the Arabians, belong to the same race with the Europeans. These nations are larger and fairer in the north, their hair is there fair, their eyes blue; whereas in the south they are dark, and often very brown, and their hair and eyes are black. There are intermixtures of these colours in the more temperate regions.

Man.

27 Lapland race. 2. All the north of the two continents is peopled with men that are very dark, with flat visage, black hair and eyes; with a body thick and extremely short. To this belong the Laplanders in Europe, the Samoiedes, Ostiacs, Tschutski in Asia, the Greenlanders and Esquimaux in America. The inhabitants of Finland resemble these almost in every circumstance, except that their height equals that of the European. The Hungarians and several wandering tribes of Asia, have a similar form, and similar language and manners with the Fins.

28 Mongul race. 3. The *Mongul* race, to which belong most of the people we call Tartars, as the Monguls, the Mantcheoux, the Calmucs, &c. and who have extended their conquests from China to Hindostan, and are even advanced as far as the frontiers of Europe, is characterized by a flat forehead, a small nose, prominent cheek-bones, black hair, very thin beard, small oblique eyes, thick lips, and a colour more or less yellow.

The Chinese and Japanese, and the Indians beyond the Ganges, to whom we give the name of Malays, appear to hold a near resemblance to the Monguls. The islands of the South sea, and the great continent of New Holland, are inhabited by original Malays. Those who live nearest the equator have the skin almost as black as the Negroes. Such are, among others, the Papons.

29 Negro race. 4. The *Negroes* inhabit all the coasts on the south of Africa from the river Senegal to the Red sea. Besides the blackness of their skin, they are distinguished by their flat nose and forehead, their long muzzle, prominent cheek bones, and frizzled hair. They are blacker than the inhabitants of Guinea, and have the nose excessively long. Those of Congo are the most comely. Towards the tropic of Capricorn they become a little paler, and take the name of Caffres. Almost all the inhabitants of the eastern coast of Africa are of this subvariety. The Hottentots form another subdivision, which is found in the most southern point, and they have cheek-bones so prominent, that their visage appears triangular. Their colour is a brown olive.

It is supposed that the interior parts of Africa, which are very hilly, are inhabited by a race of white men like Abyssinia.

30 Copper race. 5. America was peopled with men of a copper colour, with long and coarse hair, who, according to most travellers, gencrally want the beard, and even the hair on the body. Others assure us that they eradicate these. It is also said, that the fanciful form of their

heads

Man. heads arise from the compression they undergo in infancy. This race comprehends the savage nations of America, and the remaining inhabitants of Mexico and Peru. It is towards the southern point of this continent that we find the tallest race of men in the universe; but their height, which the earlier travellers represented as gigantic, scarcely exceeds six feet. These are the people so celebrated under the name of Patagonians.

All these different varieties of men can intermix and produce children, who hold a mean between the forms and colours of their parents. These intermixtures can again mix with the original races, and the produce approaches to these races according to the degree of mixture. All these progenies are prolific as well as their fathers and mothers.

It appears that there are sometimes born in the different races of our variety, subjects of a milky whiteness, which is the effect of disease, and this colour is accompanied with feebleness of body and weakness of sight. Some travellers have believed that these men form entire nations, which they have called Dariens in America, Dondos or Albinos, in Africa, and Chackleras in India. See ALBINOS.

The different colours which distinguish the varieties of the human species, reside not in the cuticle, but in the mucus and reticular membrane which is immediately below it *.

* *Cuvier.*

31 Varieties of man not distinct species.

Blumenbach remarks, that some late writers seem doubtful whether the numerous distinct races of men ought to be considered as mere varieties, which have arisen from degeneration, or as so many species altogether different. The cause of this seems chiefly to be, that they took too narrow a view in their researches, selected, perhaps, two races the most different from each other possible, and, overlooking the intermediate races that formed the connecting links between them, compared these two together; or, they fixed their attention too much on man, without examining other species of animals, and comparing their varieties and degeneration with those of the human species. The first fault is, when one, for example, places together a Senegal negro and an European Adonis, and at the same time forgets that there is not one of the bodily differences of these two beings, whether hair, colour, features, &c. which does not gradually run into the same thing of the other, by such a variety of shades, that no physiologist or naturalist is able to establish a certain boundary between these gradations, and consequently between the extremes themselves.

The second fault is, when people reason as if man were the only organized being in nature, and consider the varieties in his species to be strange and problematical, without reflecting that all these varieties are not more striking or more uncommon than those with which so many thousands of other species of organized beings degenerate, as it were, before our eyes.

We cannot here enter into the merits of the question, whether, considering the varieties of the human species which we have described, all these could have originated from one pair, as related in the Mosaic history. To those who affect to disbelieve the Mosaic account, it may be sufficient to reply, that to the almighty power of the Divine Being it was not more difficult to change and modify the descendants of one man and one woman, in order to adapt them to the different regions of the earth which they were destined to occupy, than to create at the first five or six pairs placed in different situations, to be the progenitors of the nations that we now see inhabiting the globe. Man.

32 This illustrated by comparison of man with swine.

On the nature and causes of the different colour of the skin, that characterizes the varieties of the human species, see the article COMPLEXION. On this subject we shall here add a curious comparison between the human race and swine, by Professor Blumenbach, intended to refute the second error into which he considers writers have fallen, in treating of the varieties of man.

More reasons, says he, than one have induced me to make choice of swine for this comparison; but, in particular, because they have a great similarity, in many respects, to man; not, however, in the form of their entrails, as people formerly believed, and therefore studied the anatomy of the human body purposely in swine; so that even, in the 17th century, a celebrated dispute, which arose between the physicians of Heidelberg and those of Durlach, respecting the position of the heart in man, was determined, in consequence of orders from government, by inspecting a sow, to the great triumph of the party which really was in the wrong. Nor is it because in the time of Galen, according to repeated assertions, human flesh was said to have a taste perfectly similar to that of swine; nor because the fat, and the tanned hides of both, are very like to each other; but because both, in general, in regard to the economy of their bodily structure, taken on the whole, shew unexpectedly, on the first view, as well as on closer examination, a very striking similitude.

Both, for example, are domestic animals; both *omnivora;* both are dispersed throughout all the four quarters of the world; and both consequently are exposed, in numerous ways, to the principal causes of degeneration arising from climate, mode of life, nourishment, &c.: both, for the same reason, are subject to many diseases rarely found among other animals than men and swine, such as the stone in the bladder; or to diseases exclusively peculiar to these two, such as the worms found in measled swine.

Another reason, continues he, why I have made choice of swine for the present comparison is, because the degeneration and descent from the original race are far more certain in these animals, and can be better traced, than in the varieties of other domestic animals. For no naturalist, I believe, has carried his scepticism so far as to doubt the descent of the domestic swine from the wild boar; which is much the more evident, as it is well known that wild pigs, when caught, may be easily rendered as tame and familiar as domestic swine: and the contrary also is the case; for if the latter, by any accident get into the woods, they as readily become wild again; so that there are instances of such animals being shot for wild swine, and it has not been till they were opened, and found castrated, that people were led to a discovery of their origin, and how, and at what time, they ran away. It is well ascertained, that, before the discovery of America by the Spaniards, swine were unknown in that quarter of the world, and that they were afterwards carried thither from Europe. All the varieties, therefore, through which this animal has since degenerated, belong, with the original European race,

Man. to one and the same species; and since no bodily difference is found in the human race, either in regard to stature, colour, the form of the skull, &c. as will presently appear, which is not observed in the same proportion in the swine race, this comparison, it is to be hoped, will silence those sceptics who have thought proper, on account of those varieties of the human species, to admit more than one species.

With regard to stature, the Patagonians, as is well known, have afforded the greatest employment to anthropologists. The romantic tales, however, of the old travellers, and even the more modest relations of English navigators, have been doubted by other travellers, who on the same coast sought in vain for such children of Anak. But even admitting every thing said of the size of these Patagonians, there is not among them nearly such an excess of stature as that observed in many parts of America among the swine originally carried thither from Europe; and of these we shall mention particularly those of Cuba, which are more than double the size of the original Europeans.

The natives of Guinea, Madagascar, New Holland, New Guinea, &c. are black; many American tribes are reddish brown, and the Europeans are white. An equal difference is observed among swine in different countries. In Piedmont, for example, they are black. When I passed, says our author, through that country, during the great fair for swine at Salenge, I did not see a single one of any other colour. In Bavaria, they are reddish brown; in Normandy they are all white. Human hair is, indeed, somewhat different from swines bristles, yet, in the present point of view, they may be compared with each other. Fair hair is soft, and of a silky texture; black hair is coarser, and among several tribes, such as the Abyssinians, Negroes, and the inhabitants of New Holland, it is woolly, and most so among the Hottentots. In like manner, among the white swine in Normandy, as I was assured by an incomparable observer, Sulzer of Bonneburg, the hair on the whole body is longer and softer than among other swine; and even the bristles on the back are very little different, but lie flat, and are only longer than the hair on the other parts of the body. They cannot, therefore, be employed by the brush-makers. The difference between the hair of the wild boar and the domestic swine, particularly in regard to the softer part between the strong bristles, is, as is well known, still greater.

The whole difference between the cranium of a negro and that of an European, is not in the least degree greater than that equally striking difference which exists between the cranium of the wild boar and that of the domestic swine. Those who have not observed this in the animals themselves, need only to cast their eye on the figure which Daubenton has given of both.

I shall pass over, says Blumenbach, less national varieties which may be found among swine as well as among men, and only mention, that I have been assured by Mr Sulzer, that the peculiarity of having the bone of the leg remarkably long, as is the case among the Hindoos, has been remarked with regard to the swine in Normandy. They stand very long on their hind legs; their back, therefore, is highest at the rump, forming a kind of inclined plane, and the head proceeds in the same direction, so that the snout is not far from the ground. I shall here add, that the swine in some countries have degenerated into races which in singularity far exceed every thing that has been found strange in bodily variety among the human race. Swine with solid hoofs were known to the ancients, and large herds of them are found in Hungary, Sweden, &c. In like manner the European swine, first carried by the Spaniards, in 1509, to the island of Cuba, at that time celebrated for its pearl fishery, degenerated into a monstrous race, with hoofs which were half a span in length. Man.

From these facts our ingenious author concludes, that it is absurd to allow the vast variety of swine to have descended from one original pair, and to contend that the varieties of men are so many distinct species.

33 Progress of human life.

No part of the natural history of man can be more interesting than that which describes the progressive improvement and decay of human life, from the cradle to the grave. This subject has been treated of in a most animated manner by Buffon, and we shall here give an abridgement of this part of his work.

34 Infancy,

Nothing (says M. Buffon) exhibits such a striking picture of our weakness, as the condition of an infant immediately after birth. Incapable of employing its organs, it requires assistance of every kind. In the first moments of our existence, we present an image of pain and misery, and are more weak and helpless than the young of any other animal. At birth, the infant passes from one element to another; when it leaves the gentle warmth of the tranquil fluid by which it was completely surrounded in the womb of the mother, it becomes exposed to the impressions of the air, and instantly feels the effects of that active element. The air acting upon the olfactory nerves, and upon the organs of respiration, produces a shock something like that of sneezing, by which the breast is expanded, and the air admitted into the lungs. In the mean time, the agitation of the diaphragm presses upon the bowels, and the excrements are thus for the first time discharged from the intestines, and the urine from the bladder. The air dilates the vesicles of the lungs, and after being rarefied to a certain degree, is expelled by the spring of the dilated fibres reacting upon this rarefied fluid. The infant now respires, and articulates sounds or cries.

Most animals are blind for some days after birth. Infants open their eyes to the light the moment they come into the world; but they are dull, fixed, and commonly blue. The new-born child cannot distinguish objects, because he is incapable of fixing his eyes upon them. The organ of vision is yet imperfect; the cornea is wrinkled; and perhaps the retina is too soft for receiving the images of external objects, and for communicating the sensation of distinct vision. At the end of 40 days, the infant begins to hear and to smile. About the same time it begins to look at bright objects, and frequently to turn its eyes towards the window, a candle, or any light. Now likewise it begins to weep; for its former cries and groans were not accompanied with tears. Smiles and tears are the effect of two internal sensations, both of which depend on the action of the mind. Thus they are peculiar to the human race, and serve to express mental pain or pleasure, while the cries, motions, and other marks of bodily pain and pleasure, are common to man and most of the other animals. Considering the subject as metaphysicians, we shall find that pain and pleasure form the universal

Man. universal power, which sets all our passions in motion.

The size of an infant born at the full time is commonly 21 inches; and that *fœtus*, which nine months before was an imperceptible bubble, now weighs ten or twelve pounds, and sometimes more. The head is large in proportion to the body; and this disproportion, which is still greater in the first stage of the fœtus, continues during the period of infancy. The skin of a new-born child is of a reddish colour, because it is so fine and transparent as to allow a slight tint of the colour of the blood to shine through. The form of the body and members is by no means perfect in a child soon after birth; all the parts appear to be swollen. At the end of three days, a kind of jaundice generally comes on, and at the same time milk is to be found in the breasts of the infant, which may be squeezed out by the fingers. The swelling decreases as the child grows up.

The liquor contained in the amnios leaves a viscid whitish matter upon the body of the child. In this country we have the precaution to wash the new-born infant only with warm water; but it is the custom with whole nations inhabiting the coldest climates, to plunge their infants into cold water as soon as they are born, without their receiving the smallest injury. It is even said that the Laplanders leave their children in the snow till the cold has almost stopped their respiration, and then plunge them into a warm bath. Among these people, the children are also washed thrice a day during the first year of their life. The inhabitants of northern countries are persuaded that the cold bath tends to make men stronger and more robust, and on that account accustom their children to the use of it from their infancy. The truth is, that we are totally ignorant of the power of habit, or how far it can make our bodies capable of suffering, of acquiring, or of losing.

The child is not allowed to suck as soon as it is born; but time is given for discharging the liquor and slime from the stomach, and the *meconium* or excrement, which is of a black colour, from the intestines. As these substances might sour the milk, a little diluted wine mixed with sugar is first given to the infant, and the breast is not presented to it before 10 or 12 hours have elapsed.

The young of quadrupeds can of themselves find the way to the teat of the mother: it is not so with man. The mother, in order to suckle her child, must raise it to her breasts; and, at this feeble period of life, the infant can express its wants only by cries.

New-born children have need of frequent nourishment. During the day, the breast ought to be given them every two hours, and during the night as often as they awake. At first they sleep almost continually; and they seem never to awake but when pressed by hunger and pain. Sleep is useful and refreshing to them; and it is sometimes considered as necessary to employ narcotic doses, proportioned to the age and constitution of the child, for the purpose of procuring them repose. The common way of appeasing the cries of children is by rocking them in a cradle; but this agitation must be very gentle, otherwise a great risk is run of confusing the infant's brain, and of producing a total derangement. It is necessary to their being in good health, that their sleep be long and natural. It is possible, however, that they may sleep too much, and thereby endanger their constitution. In that case, it would be proper to take them out of the cradle, and awaken them by a gentle motion, or by presenting some bright object to their eyes. At this age we receive the first impressions from the senses, which, without doubt, are more important during the rest of life than is generally imagined. Great care ought to be taken to place the cradle in such a manner that the child shall be directly opposite to the light, for the eyes are always directed towards that part of the room where the light is strongest; and if the cradle be placed sideways, one of them, by turning towards the light, will acquire greater strength than the other, and the child will squint. For the first two months, no other food should be given to the child but the milk of the nurse; and when it is of a weak and delicate constitution, this nourishment alone should be continued during the third or fourth month. A child, however robust and healthy, may be exposed to great danger and inconvenience, if any other aliment is administered before the end of the first month. In Holland, Italy, Turkey, and the whole Levant, the food of children is limited to the milk of the nurse for a whole year. The savages of Canada give their children suck for four, five, six, and sometimes even seven years. In this country, as nurses generally have not a sufficient quantity of milk to satisfy the appetite of their children, they commonly supply the want of it by panada, or other light preparations. Man.

35 Dentition.

The teeth usually begin to appear about the age of seven months. The cutting of these, although a natural operation, does not follow the common laws of nature, which acts continually on the human body without occasioning the smallest pain, or even producing any sensation. Here a violent and painful effort is made, accompanied with cries and tears. Children at first lose their sprightliness and gaiety; they become sad, restless, and fretful. The gums are red, and swelled; but they afterwards become white, when the pressure of the teeth is so great as to stop the circulation of the blood. Children apply their fingers to their mouth, that they may remove the irritation which they feel there. Some relief is given, by putting into their hands a bit of ivory or coral, or of some other hard and smooth body, with which they rub the gums at the affected part. This pressure, being opposed to that of the teeth, calms the pain for a moment, contributes to make the membrane of the gum thinner, and facilitates its rupture. Nature here acts in opposition to herself; and an incision of the gum must sometimes take place, to allow a passage to the tooth. For the period of dentition, number of teeth, &c. see ANATOMY, N° 27.

36 Diseases of infancy.

When children are allowed to cry too long, and too often, ruptures are sometimes occasioned by the efforts they make. These may easily be cured by the speedy application of bandages; but if this remedy has been too long delayed, the disease may continue through life. Children are very much subject to worms. Some of the bad effects occasioned by these animals might, according to Buffon, be prevented by giving them a little wine now and then, for fermented liquors have a tendency to prevent their generation.

Man. Though the body is very delicate in the state of infancy, it is then less sensible of cold than at any other period of life. The internal heat appears to be greater. The pulse in children is much quicker than in adults, from which we are certainly entitled to infer, that the internal heat is greater in the same proportion.

37 Mortality of infants. Till three years of age, the life of a child is very precarious. In the second or third following years it becomes more certain, and at six or seven years of age a child has a better chance of living that at any other period of life. From the bills of mortality published at London, it appears, that of a certain number of children born at the same time, one half of them dies the three first years; according to which, one-half of the human race would be cut off before they are three years of age. But the mortality among children is not everywhere so great as in London. *M. Dupre du Saint-Maur*, from a great number of observations made in France, has shewn that half of the children born at the same time are not extinct till seven or eight years have elapsed.

Among the causes which have occasioned so great a mortality among children, and even among adults, the smallpox may be ranked as the chief. But luckily the means of alleviating the effects of this terrible scourge are now universally known by inoculation, and still more by the introduction of the cowpox.

38 Speech. Children begin learning to speak about the age of 12 or 15 months. In all languages, and among every people, the first syllables they utter are *ba*, *ba*, *ma*, *ma*, *pa*, *pa*, *taba*, *abada*; nor ought this to excite any surprise, when we consider that these syllables are the sounds most natural to man, because they consist of that vowel, and those consonants, the pronunciation of which require the smallest exertion in the organs of speech. Some children at two years of age articulate distinctly, and repeat whatever is said to them; but most children do not speak till the age of two years and a half, or three years, and often later.

The life of man and of other animals is measured only from the moment of birth; they enjoy existence, however, previous to that period, and begin to live in the state of a fœtus. This state is described and explained under the article ANATOMY, N° 113. The period of infancy, which extends from the moment of birth to about 12 years of age, has already been considered.

39 Adolescence and puberty. The period of infancy is followed by that of adolescence. This begins, together with puberty, at the age of 12 or 14, and commonly ends in girls at 15, and in boys at 18, but sometimes not till 21, 23, and 25 years of age. According to its etymology (being derived from the Latin *adolescentia*), it is completed when the body has attained its full height. Thus, puberty becomes adolescence, and precedes youth. This is the spring of life; this is the season of pleasures, of loves, and of graces; but this smiling season is of short duration. Hitherto nature seems to have had nothing in view but the preservation and increase of her work; she has made no provision for the infant except what is necessary for life and growth. It has enjoyed a kind of vegetable existence which was shut up within itself, and which it was incapable of communicating. In this first stage of life, reason is still asleep; but the principles of life soon multiply, and man has not only what is necessary to his own existence, but what enables him to give existence to others. This redundancy of life can no longer be confined, but endeavours to expand and diffuse itself *. Man.

* *Buffon.*

Thus far we have followed Buffon in his animated sketch of the progress of human life; but here we must leave him for a while, as we consider the picture he has given of the approach of puberty and its corresponding circumstances to be less calculated to serve the purposes of scientific information, than to gratify idle and vicious curiosity, and rouse those passions which seldom require much excitement. The subjects of the procreation of the human species, of pregnancy and parturition, are strictly medical, and are treated of in sufficient detail under their proper heads in this work. Perhaps we shall be accused, by some of the philosophists of the present age, of being too fastidious in omitting so important and interesting a part of the natural history of man; but we had rather incur the imputation of negligence, than introduce into an article that is intended for general readers any thing that may offend the nicest delicacy.

Soon after the age of puberty the body of man attains its full stature. Some young people cease to grow after 15 or 16; while others continue to increase in height till 20, or even 23. During this interval they are usually very slender, but by degrees the limbs swell, and assume their proper shape; and before the age of 30, the body has generally attained its greatest perfection with regard to strength, consistence, and symmetry. Adolescence is considered as terminating at the age of 20 or 25, and at this period (according to the usual division of man's life into ages), youth begins. This continues till the age of 30 or 35.

40 Stature of man. The stature of man varies considerably in different climates, and under different circumstances. Authors are by no means agreed as to what should be considered the medium height of the human body. Buffon states it at from five feet or five feet and an inch, to five feet four inches, making the medium height about five feet two inches. Haller, on the contrary, reckons the true medium height of men in the temperate climates of Europe to be about five feet five or six inches. In general, women are several inches shorter than men. It has been remarked by Haller, that in mountainous countries, such as Switzerland, the inhabitants of the plains are commonly much taller than those of the higher situations. It is difficult to ascertain with precision the actual limits of the human stature; but we may remark that in surveying the inhabited parts of the earth, we find more remarkable differences in the stature of different individuals of the same nation, than in the general height of different nations. In the same climate, among the same people, and often even in the same family, we find some individuals that are far above the medium standard, and others as far below it. The former we call giants, and the latter dwarfs. See GIANT and DWARF (A).

The

(A) In addition to the relations of gigantic men given under GIANT, we shall here present our readers with Blair's

Man.

41 Manhood.

The body having acquired its full height during the period of adolescence, and its full dimensions in youth, remains for some years in the same state before it begins to decay. This is the period of manhood, which extends from the age of 30 or 35 to that of 40 or 45 years. During this stage the powers of the body continue in full vigour, and the principal change which takes place in the human figure arises from the formation of fat in different parts. Excessive fatness disfigures the body, and becomes a very cumbersome and inconvenient load.

42 Declining age.

Physiologists give the name of old age to that period of life which commences immediately after the age of manhood and ends at death, and they distinguish green old age from the age of decrepitude. But in our opinion such an extensive signification of the word ought not to be admitted. We are not old men at the age of 40 or 45, and though the body then gives signs of decay, it has not yet arrived at the period of old age. M. Daubenton observes, that it would be more proper to call it the *declining age*, because nature then becomes retrograde, the fatness and good plight of the body diminish, and certain parts of it do not perform their functions with equal vigour.

The age of decline is from 40 or 45, to 60 or 65 years of age. At this time of life, the diminution of the fat is the cause of those wrinkles which begin to appear in the face and some other parts of the body. The skin, not being supported by the same quantity of fat, and being incapable, for want of elasticity, of contracting, sinks down and forms folds. In the decline of life, a remarkable change takes place also in vision. In the vigour of our days, the crystalline lens, being thicker and more diaphanous than the humours of the eye, enables us to read letters of a very small character at the distance of eight or ten inches. But when the age of decline comes on, the quantity of the humours of the eye diminishes, they lose their clearness, and the transparent cornea becomes less convex. To remedy this inconvenience, we place what we wish to read at a greater distance from the eye; but vision is thereby very little improved, because the image of the object becomes smaller and more obscure. Another mark of the decline of life is a weakness of the stomach, and indigestion, in most people who do not take sufficient exercise in proportion to the quantity and quality of their food.

Man.

43 Old age.

At 60, 63, or 65 years of age, the signs of decline become more and more visible, and indicate old age. This period commonly extends to the age of 70, sometimes to 75, but seldom to 80. When the body is extenuated and bent by old age, man then becomes crazy. Craziness, therefore, is nothing but an infirm old age. The eyes and stomach then become weaker and weaker; leanness increases the number of the wrinkles, the beard and the hair become white; the strength and the memory begin to fail.

After 70, or at most 80 years of age, the life of man is nothing but labour and sorrow; such was the language of David near 3000 years ago. Some men of strong constitutions, and in good health, enjoy old age for a long time without decrepitude; but such instances are not very common. The infirmities of decrepitude continually increase, and at length death concludes the whole. This fatal term is uncertain. The only conclusions which we can form concerning the duration of life, must be derived from observations made on a great number of men who were born at the same time, and who died at different ages.

The signs of decrepitude form a striking picture of weakness, and announce the approaching dissolution of the body. The memory fails, the fibres become hard, the nerves blunted; deafness and blindness take place; the senses of smell, of touch, and of taste, are destroyed; the appetite fails; the necessity of eating, and more frequently

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Blair's account of O'Brien, the Irish giant, who exhibited himself at London and Edinburgh a few years ago, and died very lately. He pretended to be nearly nine feet high. We insert this account the more readily, as it exactly agrees with what we ourselves observed when O'Brien was in Edinburgh.

"I visited this Irishman (says Mr Blair), on the 5th of May 1804, at No 11. Haymarket. He was of a very extraordinary stature, but not well formed. As he would not suffer a minute examination to be made of his person, it is impossible to give any other than a short description of him. He declined the proposal of walking across the room, and I believe was afraid of discovering his extreme imbecility. He had the general aspect of a weak and unreflecting person, with an uncommonly low forehead; for as near as I could ascertain, the space above his eye-brows, in a perpendicular line to the top of his head, did not exceed two inches. He told me his age was 38 years, and that most of his ancestors, by his mother's side, were very large persons. The disproportionate size of his hands struck me with surprise, and in this he seemed to make his principal boast. He refused to allow a cast to be made of his hand, and said it had been done many years ago; but as I have seen that cast at Mr Bacon's, I am convinced the size is much too small to represent his present state of growth. All his joints were large, and perhaps rickety; his legs appeared swollen, misshapen, and I thought dropsical; however, he did not like my touching them. The feet were clumsy, and concealed as much as possible by high shoes. His limbs were not very stout, especially his arms, and I judged that he had scarcely got the use of them; for, in order to lift up his hand, he seemed obliged to swing the whole arm, as if he had no power of raising it by the action of the deltoid muscle. He certainly had a greater redundancy of bone than of muscle, and gave me the impression of a huge, overgrown, sickly boy; his voice being rather feeble as well as his bodily energies, and his age appearing under that which he affirmed. Indeed I find he gave a different account of himself to different visitors. The state of his pulse agreed with the general appearance of his person, viz. feeble, languid, and slow in its motions. With regard to his actual height, I felt anxious to detect the fallacy he held out of his being *nine feet!* Upon extending my arm to the utmost, I reached his eye-brow with my little finger: allowing his height to have been two inches and one-fourth above this, it could not be more in the whole than seven feet ten inches; so that I am persuaded the common opinion, founded on the giant's own tale, is greatly exaggerated." *Philosophical Magazine*, vol. xviii. p. 356.

Man. frequently that of drinking, are alone felt; after the teeth fall out, mastication is imperfectly performed, and digestion is very bad; the lips fall inwards; the edges of the jaws can no longer approach each other; the muscles of the lower jaw become so weak, that they are unable to raise and support it. The body sinks down; the spine is bent outward, and the vertebræ grow together at the interior part; the body becomes extremely lean; the strength fails; the decrepid wretch is unable to support himself; he is obliged to remain on a seat, or stretched in his bed; the bladder becomes paralytic; the intestines lose their spring; the circulation of the blood becomes slower; the strokes of the pulse no longer amount to the number of 80 in a minute as in the vigour of life, but are reduced to 24 and sometimes fewer; respiration is slower; the body loses its heat; the circulation of the blood ceases; death follows; and the dream of life is at an end.

44 Death. Nothing can be more humiliating to the pride and vanity of man than a comparison of the state to which his body is reduced by death, with that which it exhibits in the prime and vigour of youth. Let us contemplate a female in the prime of youth and beauty. That elegant voluptuous form, that graceful flexibility of motion, that gentle warmth, those cheeks crimsoned with the roses of delight, those brilliant eyes darting rays of love, or sparkling with the fire of genius; that countenance enlivened by sallies of wit, or animated by the glow of passion, appear, united, to form a most fascinating being. A moment is sufficient to destroy the illusion. Sense and motion cease without any apparent cause; the body loses its heat; the muscles become flat, and the angular prominences of the bones appear; the lustre of the eye is gone; the cheeks and lips are livid. These, however, are but preludes of changes still more horrible. The flesh becomes successively blue, green, and black. It attracts humidity, and while one portion evaporates in infectious emanations, another dissolves into a putrid sanies, which is also dissipated. In a word, after a few short days there remains only a small number of earthy and saline principles. The other elements are dispersed in air, and in water, to enter again into new combinations *.

Man. * Cuvier's Comp. Anat. i. 2.

Man has no right to complain of the shortness of life. Throughout the whole of living beings, there are few who unite in a greater degree all the internal causes which tend to prolong its different periods. The term of gestation is very considerable; the rudiments of the teeth are very late in unfolding; his growth is slow, and is not completed before about 20 years have elapsed.—The age of puberty, also, is much later in man than in any other animal. In short, the parts of his body being composed of a softer and more flexible substance, are not so soon hardened as those of inferior animals. Man, therefore, seems to receive at his birth the seeds of a long life; if he reaches not the distant period which nature seemed to promise him, it must be owing to accidental causes foreign to himself. Instead of saying that he has finished his life, we ought rather to say that he has not completed it.

45 Duration of human life. The natural and total duration of life is in some measure proportioned to the period of growth. A tree or an animal which soon acquires its full size, decays much sooner than another which continues to grow for a longer time. If it is true that the life of animals is eight times longer than the period of their growth, we might conclude that the boundaries of human life may be extended to a century and a half.

On the subject of longevity, and the general circumstances on which it depends, we have already treated under the article LONGEVITY, and have there given a list of a great number of persons who have been celebrated for the length of their lives. To this list we shall add a few more names in the note below (B); but on the general subject of longevity, we shall

(B) William Lecomte, a shepherd, died suddenly in 1776, in the county of Caux in Normandy, at the age of 110. Cramers, physician to the emperor, saw at Temeswar two brothers, the one aged 110, and the other 112, both of whom were fathers at that age. St Paul the hermit was 113 at his death. The Sieur Iswan-Horwaths, knight of the order of St Louis, died at Saar-Albe in Lorrain in 1775, aged almost 111. He was a great hunter. He undertook a long journey a short time before his death, and performed it on horseback. Rosine Iwiwarouska died at Minsk in Lithuania at the age of 113. Fockjel Jonas died in the year 1775, aged 113. Marsk Jonas died at Vilejac in Hungary, aged 119. John Niethen of Bakler in Zealand lived to the age of 120. Eleonora Spicer died in 1773, in Virginia, aged 121. John Argus was born in the village of Lastua in Turkey, and died in 1779, at the age of 123, having six sons and three daughters, by whom he had posterity to the fifth generation. They amounted to the number of 160 souls, and all lived in the same village. His father died at the age of 120. In December 1777, there lived in Devonshire a farmer named John Brookey, who was 134 years of age, and had been fifteen times married. The Philosophical Transactions mention an Englishman called Eccleston, who lived to the age of 143. Another Englishman, named Effingham, died in 1757 at the age of 144. Niels Jukens of Hamerset in Denmark died in 1764, aged 146. Christian Jacob Drakemberg died in 1770 at Archusen, in the 146th year of his age. This old man of the north was born at Stavangar in Norway in 1624, and at the age of 130 married a widow of 60. In Norway some men have lived to the age of 150. John Rovin, who was born at Szatlova-Carantz-Batcher, in the bannat of Temeswar, lived to the age of 172, and his wife to that of 164, having been married to him for 147 years. When Rovin died, their youngest son was 99 years of age. Peter Zorten a peasant, and a countryman of John Rovin, died in 1724, at the age of 185. His youngest son was then 97 years of age. The history and whole length pictures of John Rovin, Henry Jenkins, and Peter Zorten, are to be seen in the library of S. A. R. Prince Charles at Brussels; and engravings of Rovin and Zorten, with a short account of them, are given in Sir John Sinclair's "Code of Health and Longevity." Professor Hanovius at Dantzic, mentions in his nomenclature an old man who died at the age of 184; and another, then alive, had attained the extraordinary age of 186. For other instances, see Sir J. Sinclair's work above mentioned.

Man. shall add nothing to what has been said under that head, except the portrait of a man destined for longevity, drawn by the celebrated Hufeland.

46 Portrait of a man formed for longevity.

He has a proper and well proportioned stature, without being too tall. He is rather of the middle size, and somewhat thick set. His complexion is not too florid; at any rate, too much ruddiness in youth is seldom a sign of longevity. His hair approaches rather to the fair than the black; his skin is strong, but not rough. His head is not too big; he has large veins at the extremities, and his shoulders are rather round than flat. His neck is not too long; his belly does not project, and his hands are large, but not too deeply cleft. His foot is rather thick than long, and his legs are firm and round. He has also a broad arched chest, a strong voice, and the faculty of retaining his breath for a long time without difficulty. In general, there is a complete harmony in all his parts. His senses are good, but not too delicate; his pulse is clear and regular. His stomach is excellent, his appetite good, and digestion easy. He eats slowly, and has not too much thirst, which is always a sign of a rapid consumption. He is serene, active, susceptible of joy, love, and hope, but insensible to the impressions of hatred, anger, and avarice. His passions never become too violent. If he gives way to anger, he experiences an unusual flow of warmth, a kind of gentle fever, without any overflowing of the gall. He is fond of employment, particularly calm meditation, and agreeable speculations; is an optimist; a friend to natural affections, and domestic felicity; has no thirst after honours or riches, but is satisfied with his lot *.

* *Hufeland on prolonging Life*, i. 423.

M. Daubenton has given a table of the probabilities of the duration of life, of which the following is an abridgement. Of 23,994 children born at the same time, there will probably die,

In one year - - -	7998
Remaining $\frac{2}{3}$ or 15,996.	
In eight years - -	11,997
Remaining $\frac{1}{2}$ or 11,997.	
In 38 years - -	15,996
Remaining $\frac{1}{3}$ or 7998.	
In 50 years - - -	17,994
Remaining $\frac{1}{4}$ or 5998.	
In 61 years - - -	19,995
Remaining $\frac{1}{6}$ or 3999.	
In 70 years - - -	21,595
Remaining $\frac{1}{10}$ or 2399.	
In 80 years - - -	22,395
Remaining $\frac{1}{40}$ or 599,	
In 90 years - - -	23,914
Remaining $\frac{1}{300}$ or 79.	
In 100 years - - -	23,992
Remaining $\frac{1}{12000}$ or 2.	

47 Recapitulation.

It thus appears, that a very small number of men indeed pass through all the periods of life, and arrive at the goal marked out by nature. Innumerable causes accelerate our dissolution. The life of man consists in the activity and exercise of his organs, which grow up and acquire strength during infancy, adolescence, and youth. No sooner has the body attained its utmost perfection, than it begins to decline. Its decay is at first imperceptible, but in progress of time the membranes become cartilaginous, and the cartilages acquire the consistence of bone; the bones become more solid, and all the fibres are hardened. Almost all the fat wastes away; the skin becomes withered and scaly; wrinkles are gradually formed; the hair grows white; the teeth fall out; the face loses its shape; the body is bent, and the colour and consistence of the crystalline humour become more perceptible. The first traces of this decay begin to be perceived at the age of 40, and sometimes sooner; this is the *age of decline*. They increase by slow degrees till 60, which is the period of old age. They increase more rapidly till the age of 70 or 75. At this period craziness begins, and continues always to increase. Next succeeds decrepitude, when the memory is gone, the use of the senses lost, the strength totally annihilated, the organs worn out, and the functions of the body almost destroyed. Little now remains to be lost, and before the age of 90 or 100, death terminates at once decrepitude and life. Man.

The body then dies by little and little; its motion gradually diminishes; life is extinguished by successive gradations, and death is only the last term in the succession. When the motion of the heart, which continues longest, ceases, man has then breathed his last; he has passed from the state of life to the state of death; and as at his birth a breath opened to him the career of life, so with a breath he finishes his course.

This natural cause of death is common to all animals, and even to vegetables. We may observe that the centre of an oak first perishes and falls into dust, because these parts having become harder and more compact, can receive no further nourishment. The causes of our dissolution, therefore, are as necessary as death is inevitable; and it is no more in our power to retard this fatal term than to alter the established laws of the universe. In whatever manner death happens, the time thereof is unknown. It is considered, however, as at all times terrible, and the very thoughts of it fill the mind with fear and trouble. It is, notwithstanding our duty frequently to direct our thoughts to that event, which must inevitably happen, and by a life of virtue and innocence to prepare against those consequences which we so much dread.

As in women the bones, the cartilages, the muscles, and every other part of the body, are softer and less solid than those of men, they must require more time in hardening to that degree which occasions death. Women of course ought to live longer than men. This reasoning is confirmed by experience; for by consulting the bills of mortality, it appears, that after women have passed a certain age, they live much longer than men who have arrived at the same age. In like manner, it is found by experience, that in women the age of youth is shorter and happier than in men, but that the period of old age is longer, and attended with more trouble.

It is not our business here to consider those circumstances which are calculated to preserve health and prolong life. Many of these are mentioned in the medical articles; and those who wish to make this subject their particular study, have now ample materials provided for them, in Sir John Sinclair's "Code of Health and Longevity."

Isle of MAN, an island in the Irish sea, lying about seven leagues north from Anglesey, about the same distance west from Lancashire, nearly the like distance

Man. distance south-east from Galloway, and nine leagues east from Ireland. Its form is long and narrow, stretching, from the north-east of Ayre point to the Calf of Man, which lies south-west, at least 30 English miles. Its breadth in some places is more than nine miles, in most places eight, and in some not above five; and it contains about 160 square miles.

The first author who mentions this island is Cæsar; for there can be as little doubt, that, by the *Mona* of which he speaks in his Commentaries, placing it in the midst between Britain and Ireland, we are to understand Man; as that the *Mona* of Tacitus, which he acquaints us had a fordable strait between it and the continent, can be applied only to Anglesey. Pliny has set down both islands; *Mona*, by which he intends Anglesey, and *Monabia*, which is Man. In Ptolemy we find *Monaæda*, or *Monaida*, that is, the farther or more remote Mön. Orosius styles it *Menavia*; tells us, that it was not extremely fertile; and that this, as well as Ireland, was then possessed by the Scots. Beda, who distinguishes clearly two Menavian islands, names this the *northern Menavia*, bestowing the epithet of *southern* upon Anglesey. In some copies of Nennius, this isle is denominated *Eubonia*; in others, *Menavia*; but both are explained to mean *Man*. Alured of Beverley also speaks of it as one of the Menavian islands. The Britons, in their own language, called it *Manaw*, more properly *Main au*, i. e. "a little island," which seems to be Latinized in the word *Menavia*. All which clearly proves, that this small isle was early inhabited, and as well known to the rest of the world as either Britain or Ireland

In the close of the first century, the Druids, who were the priests, prophets, and philosophers of the old Britons, were finally expelled by Julius Agricola from the southern Mona; and we are told, that they then took shelter in the northern. This island they found well planted with firs; so that they had, in some measure, what they delighted in most, the shelter of trees; but, however, not the shelter of those trees in which they most delighted, viz. the oaks: and therefore these they introduced. No histories tell us this; but we learn it from more certain authority, great woods of fir having been discovered interred in the bowels of the earth, and here and there small groves of oaks: but as these trees are never met with intermixed, so it is plain they never grew together; and as the former are by far the most numerous, we may presume them the natural produce of the country, and that the latter were planted and preserved by the Druids. They gave the people, with whom they lived, and over whom they ruled, a gentle government, wise laws, but withal a very superstitious religion. It is also very likely that they hindered them, as much as they could, from having any correspondence with their neighbours; which is the reason that though the island is mentioned by so many writers, not one of them, before Orosius, says a word about the inhabitants. A little before this time, that is, in the beginning of the fifth century, the Scots had transported themselves thither, it is said, from Ireland. The tradition of the natives of Man (for they have a traditionary history) begins at this period. They style this first discoverer *Mannan Mac Lear*; and they say that he was a magician, who kept this country covered with mists, so that the inhabitants of other places could never find it. But the ancient chronicles of Ireland inform us, that the true name of this adventurer was *Orbsenius*, the son of Alladius, a prince in their island; and that he was surnamed *Mannanan*, from his having first entered the island of Man, and *Mac Lir*, i. e. "the offspring of the sea," from his great skill in navigation. He promoted commerce; and is said to have given a good reception to St Patrick, by whom the natives were converted to Christianity. Man.

The princes who ruled after him seem to have been of the same line with the kings of Scotland, with which country they had a great intercourse, assisting its monarchs in their wars, and having the education of their princes confided to them in time of peace.

In the beginning of the seventh century, Edwin king of Northumberland invaded the Menavian islands, ravaged Man, and kept it for some time, when, Beda assures us, there were in it about 300 families; which was less than a third part of the people in Anglesey, though Man wants but a third of the size of that island.

The second line of their princes they derive from Orri, who, they say, was the son of the king of Norway; and that there were 12 princes of this house who governed Man. The old constitution, settled by the Druids, while they swayed the sceptre, was perfectly restored; the country was well cultivated and well peopled; their subjects were equally versed in the exercise of arms and in the knowledge of the arts of peace: in a word, they had a considerable naval force, an extensive commerce, and were a great nation, though inhabiting only a little isle. Guttred the son of Orri built the castle of Russyn, A. D. 960, which is a strong place, a large palace, and has subsisted now above 800 years. Macao was the ninth of these kings, and maintained an unsuccessful struggle against Edgar, who reduced all the little sovereigns of the different parts of Britain to own him for their lord; and who, upon the submission of Macao, made him his high-admiral, by which title (*archipirata*, in the Latin of those times) he subscribes that monarch's charter to the abbey of Glastonbury.

After the death of Edward the Confessor, when Harold, who possessed the crown of England, had defeated the Norwegians at the battle of Stamford, there was amongst the fugitives one Goddard Crowman, the son of Harold the Black, of Iceland, who took shelter in the isle of Man. This isle was then governed by another Goddard, who was a descendant from Macao, and he gave him a very kind and friendly reception. Goddard Crowman, during the short stay he made in the island, perceived that his namesake was universally hated by his subjects; which inspired him with hopes that he might expel the king, and become master of the island. This he at last accomplished, after having defeated and killed Fingal the son of Goddard, who had succeeded his father. Upon this he assigned the north part of the island to the natives, and gave the south to his own people; becoming, in virtue of his conquest, the founder of their third race of princes. However he might acquire his kingdom, he governed it with spirit and prudence,

Man. prudence, made war with success in Ireland; gained several victories over the Scots in the Isles; and, making a tour through his new-obtained dominions, deceased in the island of Islay. He left behind him three sons. A civil war breaking out between the two eldest, and both of them deceasing in a few years, Magnus king of Norway coming with a powerful fleet, possessed himself of Man and the Isles, and held them as long as he lived; but, being slain in Ireland, the people invited home Olave, the youngest son of Goddard Crownan, who had fled to the court of England, and been very honourably treated by Henry the Second. There were in the whole nine princes of this race, who were all of them feudatories to the kings of England; and often resorted to their court, were very kindly received, and had pensions bestowed upon them. Henry III. in particular, charged Olave, king of Man, with the defence of the coasts of England and Ireland; and granted him annually for that service 40 marks, 100 measures of wheat, and five pieces of wine. Upon the demise of Magnus the last king of this isle, without heirs male, Alexander III. king of Scots, who had conquered the other isles, seized likewise upon this; which, as parcel of that kingdom, came into the hands of Edward I. who directed William Huntercumbe, guardian or warden of that isle for him, to restore it to John Baliol, who had done homage to him for the kingdom of Scotland.

But it seems there was still remaining a lady named *Austrica*, who claimed this sovereignty, as cousin and nearest of kin to the deceased Magnus. This claimant being able to obtain nothing from John Baliol, applied herself next to King Edward, as the superior lord. He, upon this application, by his writ which is yet extant, commanded both parties, in order to determine their right, to appear in the king's bench. The progress of this suit does not appear; but we know farther, that this lady, by a deed of gift, conveyed her claim to Sir Simon de Montacute; and, after many disputes, invasions by the Scots, and other accidents, the title was examined in parliament, in the seventh of Edward III. and solemnly adjudged to William de Montacute; to whom, by letters-patent, dated the same year, that monarch released all claim whatsoever.

In the succeeding reign, William Montacute, earl of Salisbury, sold it to Sir William Scroop, afterwards earl of Wiltshire; and, upon his losing his head, it was granted by Henry IV. to Henry Percy, earl of Northumberland; who, being attainted, had, by the grace of that king, all his lands restored, except the isle of Man, which the same monarch granted to Sir John Stanley, to be held by him of the king, his heirs and successors, by homage, and a cast of falcons to be presented at every coronation. Thus it was possessed by this noble family, who were created earls of Derby, till the reign of Queen Elizabeth; when, upon the demise of Earl Ferdinand, who left three daughters, it was, as Lord Coke tells us, adjudged to these ladies, and from them purchased by William earl of Derby, the brother of Ferdinand, from whom it was claimed by descent, and adjudged to the duke of Athol.

This island, from its situation directly in the mouth of the channel, is very beneficial to Britain, by lessening the force of the tides, which would otherwise break with far greater violence than they do at present. It is frequently exposed to very high winds; and at other times to mists, which, however, are not at all unwholesome. The soil towards the north is dry and sandy, of consequence unfertile, but not unimprovable; the mountains, which may include near two-thirds of the island, are bleak and barren; yet afford excellent peat, and contain several kinds of metals. They maintain also a kind of small swine, called *purrs*, which are esteemed excellent pork. In the valleys there is as good pasture, hay, and corn, as in any of the northern counties; and the southern part of the island is as fine soil as can be wished. They have marl and limestone sufficient to render even their poorest lands fertile; excellent slate, ragstone, black marble, and some other kinds for building. They have vegetables of all sorts, and in the utmost perfection; potatoes in immense quantities; and, where proper pains have been taken, they have tolerable fruit. They have also hemp, flax, large crops of oats and barley, and some wheat. Hogs, sheep, goats, black cattle, and horses, they have in plenty; and though small in size, yet if the country was thoroughly and skilfully cultivated, they might improve the breed of all animals, as experience has shown. They have rabbits and hares very fat and fine; tame and wild fowl in great plenty; and in their high mountains they have one airy of eagles, and two of excellent hawks. Their rivulets furnish them with salmon, trout, eels, and other kinds of fresh-water fish; on their coasts are caught cod, turbot, ling, holibut, all sorts of shell-fish (oysters only are scarce, but large and good), and herrings, of which they made anciently a great profit, though this fishery is of late much declined. Man.

The inhabitants of Man, though far from being unmixed, were perhaps, till within the course of the 18th century, more so than any other under the dominion of the crown of Great Britain; to which they are very proud of being subjects, though, like the inhabitants of Jersey and Guernsey, they have a constitution of their own, and a peculiarity of manners naturally resulting from a long enjoyment of it.—The Manks tongue is the only one spoken by the common people. It is the Old British, mingled with Norse, or the Norwegian language, and the modern language. The clergy preach and read the common prayer in it. In ancient times they were distinguished by their stature, courage, and great skill in maritime affairs. They are at this day a brisk, lively, hardy, industrious, and well-meaning people. Their frugality defends them from want: and though there are few that abound, there are as few in distress; and those that are, meet with a cheerful unconstrained relief. On the other hand, they are choleric, loquacious, and as the law till lately was cheap, and unencumbered with solicitors and attorneys, not a little litigious. The revenue, in the earl of Derby's time, amounted to about 2500l. a-year; from which, deducting his civil list, which was about 700l. the clear income amounted to 1800l. At the same time time, the number of his subjects was computed at 20,000.—The sovereign of Man, though he has long ago waved the title of *king*, was still invested

Man. vested with regal rights and prerogatives: but the distinct jurisdiction of this little subordinate royalty, being found inconvenient for the purposes of public justice and for the revenue (it affording a commodious asylum for debtors, outlaws, and smugglers), authority was given to the treasury, by stat. 12 Geo. I. c. 28. to purchase the interest of the then proprietors for the use of the crown: which purchase was at length completed in the year 1765, and confirmed by stat. 5 Geo. III. c. 26. and 39.; whereby the whole island and all its dependencies (except the landed property of the Athol family), their manorial rights and emoluments, and the patronage of the bishopric and other ecclesiastical benefices, are unalienably vested in the crown.

The most general division of this island is into north and south; and it contains 17 parishes, of which five are market towns, the rest villages. Its division with regard to its civil government, is into six sheedings, every one having its proper coroner, who is in the nature of a sheriff, is intrusted with the peace of his district, secures criminals, brings them to justice, &c. The lord chief justice Coke says, "their laws were such as scarce to be found anywhere else." In July 1786, a copper coinage for the use of the island was issued from the Tower of London.—There is a ridge of mountains runs almost the length of the isle, from whence they have abundance of good water from the rivulets and springs; and Snafield, the highest, rises about 580 yards. The air is sharp and cold in winter, the frosts short, and the snow, especially near the sea, lies not long on the ground. The prevailing rocks are clay slate, which occupies the highest parts of the island, and lower down grey-wacke, with old red sandstone and limestone, with some mines of lead, copper, and iron. The trade of this island was very great before the year 1726; but the late Lord Derby farming out his customs to foreigners, the insolence of these farmers drew on them the resentment of the government of England, who, by an act of parliament, deprived the inhabitants of an open trade with this kingdom. This naturally introduced a clandestine commerce, which they carried on with England and Ireland with prodigious success, and an immense quantity of foreign goods was run into both kingdoms, till the government in 1765 thought proper to put an entire stop to it, by purchasing the island of the duke of Athol, as already mentioned, and permitting a free trade with England. On the little isle of Peele, on the west side of Man, is a town of the same name, with a fortified castle. Before the south promontory of Man, is a little island called the *Calf of Man:* it is about three miles in circuit, and separated from Man by a channel about two furlongs broad. At one time of the year it abounds with puffins, and also with a species of ducks and drakes, by the English called *barnacles*, and by the Scots *clakes* and *solan geese*.

The principal manufactures are coarse hats, cotton goods, and linen cloth. About 500 boats are employed in the herring fishery; and previous to the late war, the salmon fishery was in a very flourishing condition, but has now declined. Great quantities of cattle, sheep, pork, butter, and eggs, are shipped to England. The imports are manufactured goods, coal, &c.

The women in the isle of Man are not remarkable for elegance of form or delicacy of features. The practice of her domestic duties, and the regulation of her domestic affairs, constitute the employment of the Manks wife; and if not so refined as the dames of more polished nations, she is perhaps as happy. Man || Manasseh

Landed property is very much divided in the island, there being scarcely six men who have estates above 500l. a year.

The internal scenery of the isle of Man is far from being beautiful, of which the chief cause is the want of wood; and the rivers are so small as to add little to the richness of the views. The Manks are fond of dancing, and dance well. Two balls in the year are given at Castletown; one on the king's birth day, the other on the queen's, and there are frequent private dances. At Ramsay, during the winter of 1801, a society of ladies and gentlemen was formed, which met three evenings in the week for the purpose of reading Shakespeare; and such a number of copies were procured, that each character of the drama was supported by a separate individual.

The inhabitants of this isle (estimated at 30,000 by Mr Colquhoun) are of the church of England; and the bishop is styled *Bishop of Sodor and Man.* He has no vote in the British house of peers. This bishoprick was first erected by Pope Gregory IV. and for its diocese had this isle and all the Hebrides or Western islands of Scotland; but which were called *Sodoroe* by the Danes, who went to them by the north, from the Swedish Sodor, Sail or Oar islands, from which the title of the bishop of Sodor is supposed to originate. The bishop's seat was at Rushin, or Castletown, in the isle of Man, and in Latin is entitled *Sodorensis.* But when this island became dependent upon the kingdom of England, the Western islands withdrew themselves from the obedience of their bishop, and had a bishop of their own, whom they entitled also *Sodorensis*, but commonly *Bishop of the Isles.* The patronage of the bishopric was given, together with the island, to the Stanleys by King Edward IV. and came by an heir-female to the family of Athol; and, on a vacancy thereof, they nominated their designed bishop to the king, who dismissed him to the archbishop of York for consecration.—By an act of parliament, the 33d of King Henry VIII. this bishopric is declared in the province of York.

Man-of-war Bird. See PELICANUS, ORNITHOLOGY *Index.*

MANAGE. See MANEGE.

MANASSEH, in Scripture history, the eldest son of Joseph, and grandson of the patriarch Jacob (Gen. xli. 50. 51.) was born in the year of the world 2290, before Jesus Christ 1714.

The tribe descended from him came out of Egypt, in number 32,200 men fit for battle, upwards of 20 years old, under the conduct of Gamaliel son of Pedahzur (Numb. ii. 20. 21.). This tribe was divided at their entrance into the land of Promise. One half had its portion beyond the river Jordan, and the other half on this side the river. The half tribe of Manassch which settled beyond the river possessed the country of Bashan, from the river Jabbok to Mount Libanus, (Numb. xxii. 33. 34. &c.); and the other half tribe of Manasseh on this side Jordan, obtained for its inheritance the country between the tribe of Ephraim to the south

Manasseh || Manchester.

south of the tribe of Issachar to the north, having the river Jordan to the east and the Mediterranean sea to the west, (Josh. xvii.).

MANASSEH, the 15th king of Judah, being the son and successor of Hezekiah. His acts are recorded in 2 Kings, xx. xxi. and 2 Chr. xxxiii.

MANATI. See TRICHECUS, MAMMALIA *Index*.

MANCA, was a square piece of gold coin, commonly valued at 30 pence; and *mancusa* was as much as a mark of silver, having its name from *manu cusa*, being coined with the hand: (*Leg. Canut.*) But the *manca* and *mancusa* were not always of that value; for sometimes the former was valued at six shillings, and the latter, as used by the English Saxons, was equal in value to our half crown. Manca *sex solidis æstimetur*, (Leg. H. 1. c. 69.). Thorn in his chronicle, tells us, that mancusa *est pondus duorum solidorum et sex denariorum;* and with him agrees Du Cange, who says, that 20 *mancæ* make 50 shillings. *Manca* and *mancusa* are promiscuously used in the old books for the same money.

MANCHA, a territory of Spain in the province of New Castile, lying between the river Guadiana and Andalusia. It is a mountainous country; and it was here that the famous Don Quixote was supposed to perform his exploits.

MANCHESTER, a town of Lancashire in England, situated in W. Long. 2. 42. N. Lat. 53. 27. Mr Whitaker conjectures, that the station was first occupied by the Britons about 500 years B. C. but that it did not receive any thing like the form of a town till 450 years after, or 50 years B. C. when the Britons of Cheshire made an irruption into the territories of their southern neighbours, and of consequence alarmed the Sestuntii, or inhabitants of Lancashire, so much, that they began to build fortresses, in order to defend their country. Its British name was *Mancenion*, that is, "a place of tents:" it was changed, however, into *Mancunium* by the Romans, who conquered it under Agricola in the memorable year of the Christian æra 79. It appears also to have been called *Manduessuedum*, *Manduessedum*, *Manucium*, and *Mancestre;* from which last it seems most evident that the present name has been derived. It is distant from London 182 miles, and from Edinburgh 214; standing near the conflux of the Irk and the Irwell, about three miles from the Mersey.

This account was drawn up about 1792.

Manchester was accounted a large and populous town even 50 years ago; but since that time it is supposed to have increased in more than triple proportion, both in respect to buildings and inhabitants. The houses amount to a number not far short of 12,000; and perhaps it may not be an overrate to reckon seven persons to each, when it is considered, that, of the houses occupied by working people of various descriptions, many have two, three, and sometimes more, families in each. For though many hundred houses have been built in the course of a few late years, yet are they constantly engaged as soon as possible; the avidity for building increasing with every new accession of inhabitants, and rents rising to a degree scarcely known in other places. The progress of this *οἰκουμενη* may be partly estimated by the price of building, land, and materials: a guinea per square yard, chief rent, having been refused for some central plots; and bricks selling at 24s. per 1000, which about four years since were not more than half the price. Such, however, has been the happy concurrence of ingenuity and industry, and such the astonishing improvements daily making in its numerous manufactures, together with the encouragement these afford to skilful artists in various branches, that streets must extend in proportion: yet population appears to have increased more rapidly than buildings; hence competitions naturally arise, and hence a *temporary* advance of rents. The manufactures of this town and neighbourhood, from humble domestic beginnings about two centuries ago, have now, after progressive improvements, acquired such celebrity, both in the scale of ornament and utility, as to spread in ten thousand forms and colours, not only in these kingdoms, but over all Europe, and even into the distant continents; being at once most precious mines of well-earned private wealth, and important contributors to the necessary public treasure of the state. Its post-office alone may afford an evidence of its extensive commerce. The population of the town may be further calculated from the great number of cotton factories within the boundaries of the town, wherein it is thought that 20,000 men, women, and children, are employed in the mere branches of preparing *warp* and *weft*. If to these be added the many hands applied to weaving, &c. &c. &c. beside all the more general mechanics, as well as householders, domestic servants, &c. Manchester may be ranked as the most populous market-town in Great Britain. The marriages in Manchester and Salford, from January 1791 to January 1792, were 1302, the christenings 2960, and the burials 2286. In 1801 the population of Manchester, including Salford, exceeded 84,000, and in 1811 it had increased to 98,573. The number of inhabited houses at the latter period, was 17,245. The streets are spacious and airy, great part of the old buildings being removed, and the new streets allowed a convenient breadth. The town is lighted every night by 2700 lamps, a number of which are lighted with gas.

Manchester.

The college was founded in 1422 by *Thomas West*, Lord Delaware; and consisted of a warden, eight fellows, four clerks, and six choristers. About the same time the present collegiate church was built (timber only having been used for the former church). This church is a fine structure of what is termed the Gothic system, and is much enriched with sculpture. The collegiate body consists of a warden, four fellows, two chaplains, two clerks (one of whom by a very late regulation, is to be at least bachelor of arts and in priest's orders), four choristers, and four singing men.

Besides the collegiate church, there are also the following. St Anne's, a handsome church begun in 1709 and finished in 1723; it is in the gift of the bishop of Chester. St Mary's, built by the clergy of the collegiate church, and consecrated upwards of 30 years ago, is a neat and indeed an elegant edifice; as is St John's, which was built about 20 years since by the late Edward Byrom, Esq. The next presentation thereof is, by act of parliament, vested in his heirs, afterwards devolving to the warden and fellows of the collegiate church. St Paul's church was erected upwards of 12 years ago, and is a handsome spacious building, chiefly brick; to which has been added, within the last two years, a lofty and substantial stone tower. St James's

Manchester.

church has been finished within the last ten years: it is a large well-lighted building of brick and stone, with a small stone steeple. St Michael's is also of brick and stone, with a square tower. It was built by the late Rev. Humphrey Owen (one of the chaplains of the collegiate church, and rector of St Mary's), in whose heirs the presentation is vested for a term of 60 years, and thenceforward in the warden and fellows of the college. To these may be added, St Thomas's, Ardwick Green, and Trinity church, Salford: for though the Irwell intervenes between Manchester and Salford, and each is governed by its respective constables; yet, being connected by three bridges, by mutual friendship, and by the common pursuit of universally useful manufactures and commerce, the two places are generally considered under the name of *Manchester*, as the borough of Southwark is not improperly deemed a part of the metropolis. In Salford there is likewise a Methodist chapel nearly finished. A new church is also about to be built and dedicated to St Stephen.—In Manchester a new church is lately finished, and called *St George's;* but divine service has not yet been performed therein. St Peter's church, at the end of Mosley-street, was begun about three years since: when finished, it will be a strong and elegant stone structure with a high spire; at present the body only is completed, and lighted, in a manner not very common, by six semicircular windows. The foundation of another church, to be called *St Clement's*, has also been laid, within the present year 1792, in Stephenson's square lately planned; and also one called the *New Jerusalem Church*, nearly finished. Besides the 14 churches above enumerated, there are, a Catholic chapel, a large Methodist chapel, a chapel for the people called *Quakers*, and 5 chapels for dissenters of other denominations.

Cheetham's Hospital, commonly called the College, because it was originally the place of residence of the warden and fellows, is deserving of particular notice. Humphrey Cheetham of Clayton near Manchester, Esq. having been remarkably successful in trade in the middle of the last century, bought the college, and liberally endowed it for the maintenance and education of 40 poor boys, admissible between the age of 6 and 10 years. By an improvement of the funds of the charity, the number of boys was increased to 60; and continued such till the Easter meeting of the feoffees in 1780, when another augmentation took place, and the number has since been constantly 80. The townships, pointed out by the founder for objects of his charity, are the following, together with the respective numbers admitted from each: Manchester, original number 14, now 28; Salford 6, now 12; Droylsden 3, now 6; Crumpsall 2, now 4; Bolton-le-moors 10, now 20; Turton 5, now 10. So that 89 persons are now annually provided for by this liberal benefactor; including for the hospital a governor, one man and five women servants, a school-master; and, on the library establishment, a librarian. (See an authentic letter in the *Gent. Mag.* for June 1792, p. 521.). The boys of this hospital are comfortably provided for till the age of 14, when they are further clothed, and with a premium placed apprentices to useful trades; and, in order to incite early habits of industry, to make them good servants, and at length good masters, it has been suggested to furnish some kind of easy employment for a small part of their time not engaged at school. The Library, which occupies an extensive gallery of the same building, owes its foundation and increasing importance to the same benevolent source. The annual value of the fund originally bequeathed for the purchase of books and for a librarian's salary was 116l.; but by recent improvements of the estate, the income is more than thrice that sum. The books at this time amount to 10,000 volumes, of which a catalogue handsomely printed in 2 volumes 8vo has been published by the present librarian, the Rev. John Radcliffe, A. M. At stated hours on all days, except Sundays and other holidays, the studious may have free access to read, *in the library*, any book it contains; and in order to render it comfortable during the cold season of the year, several stoves are kept heated at the reading hours. This college and a large inclosed area are situated upon a high perpendicular rock, bounded by the Irk close to its confluence with the Irwell; and is thought by Mr Whitaker to be included, as well as the collegiate church, within the boundaries of the ancient Roman prætorium; the whole of which site towards the Irwell, as on the side of the Irk, is considerably elevated above the water and the opposite land of Salford. The free-school, higher up on the same side of the Irk, almost joining to the college, is supported by the rents of three mills; one of which is for grinding malt, another for corn, and the third is employed as a snuff mill. These rents are now increased to 700l. *per annum*, from which salaries are paid to three masters and two assistants. The scholars educated here have certain exhibitions allowed at the university; and such of them as are entered at Brazennose college Oxford have a chance of obtaining some valuable exhibitions arising from lands in Manchester bequeathed by Mr Hulme. The deserved reputation of this school is a powerful recommendation of its scholars entering at the universities. The Academy is a large and commodious building, raised by the subscriptions of several respectable dissenters, and placed under the care of able tutors. Here youth above 14 years of age are admitted, and instructed in the various branches of liberal knowledge, preparatory to trade or the professions. The Literary and Philosophical Society of Manchester was instituted in the beginning of the year 1781, and is well known by its Memoirs, of which several volumes 8vo, containing several excellent papers on various literary and scientific subjects, have been published; these have been translated into the German language. A society was established here in November 1789, under the name of the *Lancashire Humane Society*, for the encouragement of all who may attempt the recovery of persons apparently drowned. The Infirmary, Dispensary, Lunatic Asylum, and public Baths, are all situated on one large airy plot of land, in the most elevated and agreeable part of the town; a pleasant grass-plot and gravel-walk extending the whole length of the buildings; a canal intervening between them and the public street, next to which it is guarded by iron palisades. The Lying-in hospital is situated in Salford, at the end of

Manchester. the old bridge. A new Work-house is nearly completed; and for such a purpose a happier spot could not be found in any town than that whereon it is erected, being on an equal eminence with the college on the opposite side of the Irk, and promising the greatest possible comforts to such as may be necessitated to become its inhabitants. The Exchange, a fine and spacious building, was erected in 1808 by subscription. The Theatre is a neat building, wherein the boxes are placed in a semicircle opposite to the stage. The Gentlemen's Concert-room is an elegant building, capacious enough to accommodate 1200 persons. The concerts are supported by annual subscriptions: but strangers and military gentlemen have free admission to the private concerts; as also to the public concerts, with a subscriber's ticket. The new Assembly-rooms are large and commodious. A Circus is almost finished. Here are two Market-places, the old and the new; which are well supplied with every thing in season, though at high rates. There are several charity-schools belonging to different churches and chapels, where children are furnished with clothes and taught to read. The Sunday-schools are numerous, and afford instruction to upwards of 5000 children. A Lancasterian school was founded in 1809, and two schools on the principles of Dr Bell in 1812.

Over the Irwell are three bridges, uniting the town with Salford: the old bridge is very high at the Manchester end, whence it slopes into Salford. The middle bridge, four feet wide, raised upon timber and flagged, is only for the accommodation of foot-passengers, who from the Manchester side must descend to it by nearly forty steps. The lower bridge is a handsome stone building of two arches; this bridge affords a level road for two or three carriages abreast. It was undertaken and finished by the private subscription of a few gentlemen; and a small toll is taken for all passing, which toll is now annually let by auction, and pays the proprietors remarkably well.—From Manchester there are likewise the same number of bridges over the Irk; only one, however, is adapted for the passage of carriages. The Irwell, having at a great expence been rendered navigable for vessels of 20 or 30 tons burden, there is a constant communication between Liverpool, Manchester, and the intermediate places on the Irwell and Mersey, to the great advantage of the proprietors of the country at large. This navigation, and more especially the duke of Bridgewater's canal, opening a passage from Manchester to the Mersey at 30 miles distance, have, together, greatly contributed to the present highly flourishing state of the town. Advantages still greater, because more widely diffusive, may result from the intended union of the Humber and the Mersey by means of canals. Indeed, every mile of canal would benefit many miles of land; and such would be the reciprocity of interest, that it would undoubtedly extend and be felt far beyond the visible measurement of the navigation."

The News Room and Library in Manchester is an elegant building, and an ornament to the town; and as it comprehends in it a news room, circulating library, and reading room, must be productive of general utility. The proposal of this institution met with much opposition at first; but it was finally carried by the unwearied exertions of a Mr Robinson, a man whose character was universally loved and admired. Manchester || Mancipatio.

We must not omit to notice the new penitentiary house, called the *New Bailey*, for separate confinement of various criminals. Over the entrance is a large session room, with adjoining rooms for the magistrates, council, jurors, &c. Beyond this, in the centre of a very large area inclosed by very high walls, stands the Prison, an extensive building, forming a cross three stories high; and the four wards of each story may in an instant be seen by any person in its centre. This prison is kept surprisingly neat and healthy; and such as can work at any trade, and are not confined for crimes of the greatest magnitude, are employed in a variety of branches; so that one may be seen beating and cleansing cotton, another carding it, another roving, and a fourth spinning. In the next place may be observed a man or a woman busy at the loom; and in another, one or more engaged in cutting and raising the velvet pile. Hence industry is not suffered to slumber in the solitary cell, nor to quit it under the acquired impressions of that torpor which formerly accompanied the emancipated prisoner from his dungeon; rendering him, perhaps, totally unfit for the duties of honest society, though well qualified, in all probability, to herd with gamblers, and be then, if not before, initiated into their pernicious mysteries.—At Kersal-moor, three miles distant, horse-races are annually permitted. The banks of the rivers and various brooks about the town afford excellent situations for the numerous dye-houses employed for a multitude of fabrics. Among other things the manufacture and finishing of hats is carried on to an extent of great importance.—The general market is here on Saturdays. Tuesday's market is chiefly for transacting business between the traders and manufacturers of the town and circumjacent country. The fairs are on Whit-Monday, October 1st, and November 17th.

Manchester is a manor with courts leet and baron. It sends no members to parliament, but gives title to a duke. The annual fall of rain is here about 42 inches; though from January 1791 to January 1792 it was 44 inches. The sun's greatest heat in 1791 was 76°, July 17.

MANCHINEEL. See HIPPOMANE, BOTANY *Index*.

MANCIPATIO, was a term made use of in the Roman law, and may be thus explained; every father had such a regal authority over his son, that before the son could be released from his subjection and made free, he must be three times over sold and bought, his natural father being the vender. The vendee was called *pater fiduciarius*. After this fictitious bargain, the *pater fiduciarius* sold him again to the natural father, who could then, but not till then, *manumit* or make him free. The imaginary sale was called *mancipatio*; and the act of giving liberty or setting him free after this was called *emancipatio*.

MANCIPATIO also signifies the selling or alienating of certain lands by the balance, or money paid by weight, and five witnesses. This mode of alienation took place only amongst Roman citizens, and that only in respect to certain estates situated in Italy, which were called *mancipia*.

MANCIPLE,

Manciple || Mandarins.

MANCIPLE (*manceps*), a clerk of the kitchen, or caterer. An officer in the inner temple was anciently so called, who is now the steward there; of whom Chaucer, the ancient English poet, some time a student of that house, thus writes:

A manciple there was within the temple,
Of which all caterers might take ensample.

This officer still remains in colleges in the universities.

MANCUNIUM, in *Ancient Geography*, a town of the Brigantes in Britain. Now *Manchester* in Lancashire. See MANCHESTER.

MANCUS (formed of *manu cusus*), in antiquity, an Anglo-Saxon gold coin, equal in value to $2\frac{1}{2}$ solidi, or 30 pence; and in weight to 55 Troy grains. The first account of this coin that occurs in the history of our country, is about the close of the 8th century, in an embassy of Cenwulf king of Mercia to Leo III. requesting the restoration of the jurisdiction of the see of Canterbury: this embassy was enforced by a present of 120 mancuses. Ethelwolf also sent yearly to Rome 300 mancuses: and these coins are said to have continued in some form or other till towards the conclusion of the Saxon government. The heriots of the nobility are chiefly estimated by this standard in Canute's laws. It came originally from Italy, where it was called *ducat:* and is supposed to have been the same with the drachma or miliarensis current in the Byzantine empire.

MANDAMUS, in *Law*, a writ that issues out of the court of king's bench, sent to a corporation, commanding them to admit or restore a person to his office. This writ also lies where justices of the peace refuse to admit a person to take the oaths in order to qualify himself for enjoying any post or office; or where a bishop or archdeacon refuses to grant a probate of a will, to admit an executor to prove it, or to swear a a church-warden, &c.

MANDANES, an Indian prince and philosopher, who for the renown of his wisdom was invited by the ambassadors of Alexander the Great to the banquet of the son of Jupiter. A reward was promised him if he obeyed, but he was threatened with punishment in case of a refusal. Unmoved by promises and threatenings, the philosopher dismissed them with observing, that though Alexander ruled over a great part of the universe, he was not the son of Jupiter; and that he gave himself no trouble about the presents of a man who possessed not wherewithal to content himself. "I despise his threats (added he): if I live, India is sufficient for my subsistence; and to me death has no terrors, for it will only be an exchange of old age and infirmity for the happiness of a better life."

MANDARINS, a name given to the magistrates and governors of provinces in China, who are chosen out of the most learned men, and whose government is always at a great distance from the place of their birth. *Mandarin* is also a name given by the Chinese to the learned language of the country; for besides the language peculiar to every province, there is one common to all the learned in the empire, which is in China what Latin is in Europe: this is called the *mandarin tongue*, or the *language of the court*.

Mandate || Manding.

MANDATE, in *Law*, a judicial commandment to do something. See the article MANDAMUS.

MANDATE, in the canon law, a rescript of the pope commanding an ordinary collator to put the person therein named in possession of the first vacant benefice in his collation.

MANDATUM, was a fee or retainer given by the Romans to the *procuratores* and *advocati*. The *mandatum* was a necessary condition, without which they had not the liberty of pleading. Thus the legal eloquence of Rome, like that of our own country, could not be unlocked without a golden key.

MANDERSCHEIT, a town of Germany in the circle of the Lower Rhine, and in the electorate of Triers, capital of a county of the same name, between the diocese of Triers and the duchy of Juliers. E. Long. 6. 32. N. Lat. 50. 20.

MANDEVILLE, SIR JOHN, a physician, celebrated on account of his travels, was born at St Alban's, about the beginning of the 14th century. He had a liberal education, and applied himself to the study of physic; but being at length seized with an invincible desire of seeing distant parts of the globe, he left England in 1332, and did not return till 34 years after. His friends, who had long supposed him dead, did not know him when he appeared. He had travelled through almost all the east, and made himself master of a great variety of languages. He particularly visited Scythia, Armenia the Greater and Less, Egypt, Arabia, Syria, Media, Mesopotamia, Persia, Chaldea, Greece, Dalmatia, &c. His rambling disposition did not suffer him to rest; for he left his own country a second time, and died at Liege in the Netherlands in 1372. He wrote An Itinerary, or an Account of his Travels, in English, French, and Latin.

MANDEVILLE, *Bernard de*, an eminent writer in the 18th century, was born in Holland, where he studied physic, and took the degree of doctor in that faculty. He afterwards came over into England, and in 1714 published a poem, entitled "The Grumbling Hive, or Knaves turned Honest;" upon which he afterwards wrote remarks, and published the whole at London, 1723, in 8vo, under the title of "The Fable of the Bees, or private Vices made public Benefits; with an Essay on Charity and Charity-schools, and a Search into the Nature of Society." This book was presented by the jury of Middlesex in July the same year, and severely animadverted upon in "A Letter to the Right Honourable Lord C." printed in the London Journal of Saturday July 27. 1723. Our author published a Vindication. His book was attacked by several writers. He published other pieces, and died in 1724.

MANDING, a large state in the interior of Africa, situated in N. Lat. 12. 40. and W. Long. 6. 40. The government, according to Mr. Park, seems to be a kind of republic, or rather an oligarchy. Many species of edible roots are found here; but the sugar cane, coffee, and the cocoa tree, appear to be unknown to the inhabitants. The Mandingoes are reputed a very gentle race of people, cheerful in their dispositions, inquisitive, credulous, simple, and fond of flattery. The men, in general, are about the middle size, well-shaped, strong, and capable of enduring great labour; the women are good-

Manding. good-natured, sprightly, and agreeable. Both sexes dress in cotton cloth of their own manufacture, and both seem irresistibly inclined to commit depredations on the property of unprotected strangers; yet, strange as it may appear, they will contribute to the personal safety of the very people whom they are bent upon plundering.

Parental and filial affection is very strong between the mother and her child, but not so between the father and his children, which must originate from that divided love which never fails to be an attendant on polygamy. The care of the mother extends to the cultivation of the mind; and one of the first lessons in which they instruct their offspring, is the *practice of truth*. To suckle their children three years is an ordinary occurrence, during which time the husband devotes all his attention to his other wives. When a young man intends to marry a young girl, he first addresses the parents, as her consent is not deemed necessary. If the parents are agreeable, she must either accept of the hand of her lover, or continue unmarried all her life long. The Mandingoes practise circumcision both on males and females, which is a very painful operation, but not performed by them from any religious motive, for they have a superstitious notion that it contributes to render the married state prolific. Mr Park assures us, that the belief of one God, and a future state of rewards and punishments, is universal among them, but that the management of all sublunary concerns is committed to certain subordinate or tutelary agents, whose wrath they deprecate by every mean in their power. These people seldom arrive at old age, being gray-headed and covered with wrinkles about 40, and few reach the age of 60, although their diseases are few, being confined almost to fevers, fluxes, elephantiasis, and a leprosy of the worst kind, together with the *Guinea worm*. Their feelings, on the death of a relation, are manifested by loud and dismal howlings; and the body is interred, when rolled up in white cotton with a mat above it, on the day of its decease. The men cultivate the ground, and the women manufacture cotton cloth, viz. the spinning and dyeing of it, for it is wove by the men in looms of about four inches broad. Here also there are manufactories of leather and iron. They tan and dress leather with great expedition, and are said to be acquainted with the smelting of gold, which they convert into a great variety of ornaments, executed with much taste and ingenuity.

Their notions of geography are rather puerile, as they conceive the earth to be an extended plane, the termination of which no eye has as yet discovered, it being, according to them, overhung with clouds and darkness. They suppose the sea to be a large river of salt water, on the farther shore of which is situated a country called *Tobaubodoo*, or the land of the white people; at a distance from which they describe another country, which they believe to be inhabited by cannibals of a gigantic size, called *Koomi*.

As to their ideas of property, they consider the lands in native woods to belong to government. When any individual of free condition has the means of cultivating more land than he actually possesses, he applies to the chief man of the district, who allows him an extension of territory, on condition of forfeiture, if the lands are not brought into cultivation by a given period. The condition being fulfilled, the soil becomes vested in the possessor, and in all probability descends to his heirs. Manding || Manetho.

MANDRAGORA. See ATROPA, BOTANY *Index*.

MANDRAKE. See ATROPA and MUSA, BOTANY *Index*.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe. Of these there are several kinds; as *Flat Mandrels*, which have three or more little pegs or points near the verge, and are used for turning flat boards on. *Pin Mandrels*, which have a long wooden shank to fit into a round hole made in the work to be turned. *Hollow Mandrels*, which are hollow of themselves, and used for turning hollow work. *Screw Mandrels*, for turning screws, &c.

MANE, the hair hanging down from a horse's neck; which should be long, thin, and fine: and if frizzled, so much the better.

MANEGE, or MANAGE, the exercise of riding the great horse; or the ground set apart for that purpose; which is sometimes covered, for continuing the exercise in bad weather; and sometimes open, in order to give more liberty and freedom both to the horseman and horse. See HORSEMANSHIP.

The word is borrowed from the French *manage*, and that from the Italian *maneggio;* or, as some will have it, *à manu agendo*, "acting with the hand."

MANES, a poetical term, signifying the shades or souls of the deceased. The heathens used a variety of ceremonies and sacrifices to appease the manes of those who were deprived of burial. See LEMURES and LEMURIA.

Dii Manes, were the same with *inferi*, or the infernal gods, who tormented men; and to these the heathens offered sacrifices to assuage their indignation.

The heathen theology is a little obscure with regard to these gods manes. Some hold, that they were the souls of the dead; others, that they were the genii of men; which last opinion suits best with the etymology of the word.

The heathens, it is pretty evident, used the word *manes* in several senses; so that it sometimes signified the ghosts of the departed, and sometimes the infernal or subterraneous deities, and in general all divinities that presided over tombs.

The invocation of the manes of the dead seems to have been very frequent among the Thessalians; but it was expressly prohibited by the Romans. See LARES.

MANES, the founder of the Manichean system. See MANICHEES.

MANETHO, an ancient Egyptian historian, who pretended to take all his accounts from the sacred inscriptions on the pillars of Hermes Trismegistus. He was high priest of Heliopolis in the time of Ptolemy Philadelphus, at whose request he wrote his history in Greek; beginning from their gods, and continuing it down to near the time of Darius Codomannus who was conquered by Alexander the Great. His history of Egypt is a celebrated work, that is often quoted by Josephus and other ancient authors. Julius Africanus gave an abridgement of it in his Chronology. Manetho's work is however lost; and there only

Manetho || Mangeart.

only remain some fragments extracted from Julius Africanus, which are to be found in Eusebius's Chronica.

MANFREDONIA, a port town of Naples, on the gulf of Venice, which arose on the ruins of the ancient Sipontum; (see the article SIPONTUM). It received its name from its founder *Manfred;* who transplanted hither the few inhabitants that remained at Sipontum, and attracted other settlers to it by various privileges and exemptions. In order to found it under the most favourable auspices, he called together all the famous professors of astrology (a science in which both he and his father placed great confidence), and caused them to calculate the happiest hour and minute for laying the first stone. He himself drew the plans, traced the walls and streets, superintended the works, and by his presence and largesses animated the workmen to finish them in a very short space of time. The port was secured from storms by a pier; the ramparts were built of the most solid materials; and in the great tower was placed a bell of so considerable a volume as to be heard over all the plain of Capitanata, in order to alarm the country in case of an invasion. Charles of Anjou afterwards removed the bell to Barri, and offered it at the shrine of St Nicholas, as a thanksgiving for the recovery of one of his children. In spite of all the precautions taken by Manfred to secure a brilliant destiny to his new city, neither his pains, nor the horoscopes of his wizards, have been able to render it opulent or powerful. At present, Mr Swinburne informs us, it scarce musters 6000 inhabitants, though most of the corn exported from the province is shipped off here, and a direct trade carried on with Venice and Greece, for which reason there is a lazaretto established; but from some late instances we may gather, that if the kingdom of Naples has for many years past remained free from the plague, it is more owing to good luck, and the very trifling communication with Turkey, than to the vigilance or incorruptibility of the officers of this port. In 1620, the Turks landed and pillaged Manfredonia. All sorts of vegetables abound here, for flavour and succulency infinitely superior to those raised by continual waterings in the ungrateful soil of Naples. Lettuce in particular is delicious, and fish plentiful and cheap. E. Long. 15. 56. N. Lat. 41. 42.

MANGANESE, or MAGNESIA NIGRA, a metallic substance, the oxide of which has been long known by the name of glass-makers soap, from its property of rendering glass colourless. See CHEMISTRY and MINERALOGY *Index.*

MANGE, in dogs. See FARRIERY *Index.*

MANGE. See FARRIERY, N° 333.

MANGEART, DOM THOMAS, a Benedictine of the congregation of St Vanne and St Hidulphe, whose knowledge was an ornament to his order. It gained him also the titles of antiquarian, librarian, and counsellor to Charles duke of Lorrain. He was preparing a very considerable work when he died, A. D. 1763, before he had put his last hand to his book, which was published by Abbé Jacquin. This production appeared in 1763, in folio, with this title: *Introduction à la science des Medailles, pour servir à la connoissance des Dieux, de la Religion, des Sciences, des Arts, et de tout ce qui appartient à l'Histoire ancienne, avec les preuves tirées des Medailles.* The elementary treatises on the numismatic science were not sufficiently extensive, and the particular dissertations were by far too tedious and prolix. This learned Benedictine has collected into a single volume all the principles contained in the former, and all the ideas of any consequence which are to be found scattered through the latter. His work may serve as a supplement to Montfaucon's *Antiquity explained.* From Mangeart we likewise have a volume of sermons; and a treatise on Purgatory; Nancy, 1739, 2 vols. 12mo.

Mangeart || Mania.

MANGEL-WURZEL. See BETA, BOTANY *Index;* and AGRICULTURE *Index.*

MANGER, is a raised trough under the rack in the stall, made for receiving the grain or corn that a horse eats.

MANGER, a small apartment, extending athwart the lower deck of a ship of war, immediately within the hause-holes, and fenced on the after part by a partition, which separates it from the other part of the deck behind it. This partition serves as a fence to interrupt the passage of the water, which occasionally gushes in at the hause-holes, or falls from the wet cable whilst it is heaved in by the capstern. The water, thus prevented from running aft, is immediately returned into the sea by several small channels, called *scuppers*, cut through the ship's side within the manger. The manger is therefore particularly useful in giving a contrary direction to the water that enters at the hause-holes, which would otherwise run aft in great streams upon the lower deck, and render it extremely wet and uncomfortable, particularly in tempestuous weather, to the men who mess and sleep in different parts thereof.

MANGET, JOHN-JAMES, an eminent physician, born at Geneva in 1652. The elector of Brandenburg made him his first physician in 1699; in which post he continued till his death, which happened at Geneva in 1742. He wrote many works; the most known of which are, 1. A collection of several Pharmacopœias, in folio. 2. *Bibliotheca Pharmaceutico-medica.* 3. *Bibliotheca Anatomica.* 4. *Bibliotheca Chemica.* 5. *Bibliotheca Chirurgica.* 6. A *Bibliotheca* of all the authors who have written on medicine, in 4 vols folio. All these works are in Latin. Daniel le Clere, the author of a History of Physic, assisted him in writing them.

MANGIFERA, the MANGO-TREE; a genus of plants belonging to the pentandria class; and in the natural method ranking with those of which the order is doubtful. See BOTANY *Index.*

MANGLE, a machine for smoothing linen. See MECHANICS *Index.*

MANGOSTAN, or MANGOSTEEN. See GARCINIA, BOTANY *Index.*

MANGROVE. See RHIZOPHORA, BOTANY *Index.*

MANHEIM, a town of Germany, in the Lower Palatinate, with a very strong citadel, and a palace, where the elector Palatine often resides. It is seated at the confluence of the rivers Neckar and Rhine, in E. Long. 8. 33. N. Lat. 49. 25. It surrendered to the French in September 1795; but it was retaken by the Austrians in September following.

MANHOOD, that stage of life which succeeds puberty or adolescence. See MAN.

MANIA, or MADNESS. See MEDICINE *Index.*

MANICHEES,

Manichees. MANICHEES, or MANICHEANS (*Manichæi*), a sect of ancient heretics, who asserted two principles; so called from their author *Manes* or *Manichæus*, a Persian by nation, and educated among the Magi, being himself one of that number before he embraced Christianity.

This heresy had its first rise about the year 277, and spread itself principally in Arabia, Egypt, and Africa. St Epiphanius, who treats of it at large, observes that the true name of this heresiarch was Cubricus; and that he changed it for *Manes*, which in the Persian or Babylonish language signifies *vessel*. A rich widow, whose servant he had been, dying without issue, left him store of wealth; after which he assumed the title of the *apostle* or *envoy of Jesus Christ*.

Manes was not contented with the quality of apostle of Jesus Christ, but he also assumed that of the Paraclete, whom Christ had promised to send: which Augustine explains, by saying that Manes endeavoured to persuade men, that the Holy Ghost did personally dwell in him with full authority. He left several disciples, and among others, Addas, Thomas, and Hermas. These he sent in his lifetime into several provinces to preach his doctrine. Manes, having undertaken to cure the king of Persia's son, and not succeeding, was put in prison upon the young prince's death, whence he made his escape; but he was apprehended soon after, and flayed alive.

However, the oriental writers, cited by D'Herbelot and Hyde, tell us, that Manes, after having been protected in a singular manner by Hormizdas, who succeeded Sapor in the Persian throne, but who was not able to defend him, at length, against the united hatred of the Christians, the Magi, the Jews, and the Pagans, was shut up in a strong castle, to serve him as a refuge against those who persecuted him on account of his doctrine. They add, that after the death of Hormizdas, Varanes I. his successor, first protected Manes, but afterwards gave him up to the fury of the Magi, whose resentment against him was due to his having adopted the Sadducean principles, as some say; while others attribute it to his having mingled the tenets of the Magi with the doctrines of Christianity. However, it is certain that the Manicheans celebrated the day of their master's death. It has been a subject of much controversy whether Manes was an impostor. The learned Dr Lardner has examined the arguments on both sides; and though he does not choose to deny that he was an impostor, he does not discern evident proofs of it. He acknowledges, that he was an arrogant philosopher and a great schemist; but whether he was an impostor, he cannot certainly say. He was much too fond of philosophical notions, which he endeavoured to bring into religion, for which he is to be blamed: nevertheless, he observes, that every bold dogmatizer is not an impostor.

The doctrine of Manes was a motley mixture of the tenets of Christianity with the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one; the first a most pure and subtle matter, which he called *light*, did nothing but good; and the second, a gross and corrupt substance, which he called *darkness*, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his Isis and Osiris. Manichees.

Manes borrowed many things from the ancient Gnostics; on which account many authors consider the Manicheans as a branch of the Gnostics.

In truth, the Manichean doctrine was a system of philosophy rather than of religion. They made use of amulets, in imitation of the Basilidians; and are said to have made profession of astronomy and astrology. They denied that Jesus Christ, who was only God, assumed a true human body, and maintained it was only imaginary; and therefore, they denied his incarnation, death, &c. They pretended that the law of Moses did not come from God, or the good principle, but from the evil one; and that for this reason it was abrogated. They rejected almost all the sacred books in which Christians look for the sublime truths of their holy religion. They affirmed, that the Old Testament was not the work of God, but of the prince of darkness, who was substituted by the Jews in the place of the true God. They abstained entirely from eating the flesh of any animal; following herein the doctrine of the ancient Pythagoreans; they also condemned marriage. The rest of their errors may be seen in St Epiphanius and St Augustine; which last, having been of their sect, may be presumed to have been thoroughly acquainted with them.

Though the Manichees professed to receive the books of the New Testament, yet in effect they only took so much of them as suited with their own opinions. They first formed to themselves a certain idea or scheme of Christianity; and to this adjusted the writings of the apostles, pretending that whatever was inconsistent with this had been foisted into the New Testament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pass for apostolical writings; and even are suspected to have forged several others, the better to maintain their errors. St Epiphanius gives a catalogue of several pieces published by Manes, and adds extracts out of some of them. These are the Mysteries, Chapters, Gospel, and Treasury.

The rule of life and manners which Manes prescribed to his followers was most extravagantly rigorous and severe. However, he divided his disciples into two classes; one of which comprehended the perfect Christians, under the name of the *elect*; and the other the imperfect and feeble, under the title of *auditors* or *hearers*. The elect were obliged to a rigorous and entire abstinence from flesh, eggs, milk, fish, wine, all intoxicating drink, wedlock, and all amorous gratifications; and to live in a state of the severest penury, nourishing their emaciated bodies with bread, herbs, pulse, and melons, and depriving themselves of all the comforts that arise from the moderate indulgence of natural passions, and also from a variety of innocent and agreeable pursuits. The auditors were allowed to possess houses, land, and wealth, to feed on flesh, to enter into the bonds of conjugal tenderness; but this liberty was granted them with many limitations, and under the strictest conditions of moderation and temperance. The general assembly of the Manicheans was headed by a

Manichees || Manilla.

president, who represented Jesus Christ. There were joined to him 12 rulers or masters, who were designed to represent the 12 apostles, and these were followed by 72 bishops, the images of the 72 disciples of our Lord. These bishops had presbyters or deacons under them, and all the members of these religious orders were chosen out of the class of the elect. Their worship was simple and plain; and consisted of prayers, reading the scriptures, and hearing public discourses, at which both the auditors and elect were allowed to be present. They also observed the Christian appointment of baptism and the eucharist. They kept the Lord's day, observing it as a fast; and they likewise kept Easter and Pentecost.

Towards the 4th century, the Manicheans concealed themselves under various names, which they successively adopted, and changed in proportion as they were discovered by them. Thus they assumed the names of Encratites, Apotactics, Saccophori, Hydroparastates, Solitaries, and several others, under which they lay concealed for a certain time, but could not however long escape the vigilance of their enemies. About the close of the 6th century, this sect gained a very considerable influence, particularly among the Persians.

Toward the middle of the 12th century, the sect of Manichees took a new face, on occasion of one Constantine, an Armenian, and an adherer to it; who took upon him to suppress the reading of all other books besides the Evangelists and the epistles of St Paul, which he explained in such a manner as to make them contain a new system of Manicheism. He entirely discarded all the writings of his predecessors; rejecting the chimeras of the Valentinians, and their 30 æons; the fable of Manes, with regard to the origin of rain, and other dreams; but still retained the impurities of Basilides. In this manner he reformed Manicheism, insomuch that his followers made no scruple of anathematizing Scythian, Buddas, called also *Addas* and *Terebinth*, the contemporaries and disciples, as some say, and, according to others, the predecessors and masters of Manes, and even Manes himself; Constantine being now their great apostle. After he had seduced an infinite number of people, he was at last stoned by order of the emperor.

This sect prevailed in Bosnia and the adjacent provinces about the close of the 15th century; propagated their doctrines with confidence, and held their religious assemblies with impunity.

MANICORDON, or MANICHORD, a musical instrument in form of a spinet; the strings of which, like those of the clarichord, are covered with little pieces of cloth, to deaden as well as to soften their sound, whence it is also called the *dumb spinet*.

MANIFESTO; a public declaration made by a prince in writing, showing his intentions to begin a war or other enterprise, with the motives that induce him to it, and the reasons on which he founds his rights and pretensions.

MANIHOT, or MANIOC. See JATROPHA, BOTANY *Index*.

MANILLA, LUCONIA, or *Luzon*, the name of the largest of the Philippine islands in the East Indies, subject to Spain. It had the name of *Luzon* from a custom that prevailed among the natives of beating or bruising their rice in wooden mortars, before they either boiled or baked it; *luzon* in their language signifying "a mortar." Manilla.

As to situation, it is remarkably happy, lying between the eastern and western continents, and having China on the north, at the distance of about 60 leagues; the islands of Japan on the north-east, at the distance of about 250 leagues from the nearest of them; the ocean on the east; the other islands on the south; and on the west Malacca, Patana, Siam, Cambodia, Cochin-China, and other provinces of India, the nearest at the distance of 300 leagues.

The middle of this island is in latitude 15° north; the east point in 13° 38', and the most northern point in 19°. The shape of it is said to resemble that of an arm bent; the whole length being about 160 Spanish leagues, the greatest breadth between 30 and 40, and the circumference about 350. As to the longitude the charts differ, some making the middle of the island to lie 113° east from London, and others 106°. The climate is hot and moist. One thing is held very extraordinary, that in stormy weather there is much lightning and rain, and that thunder is seldom heard till this is over. During the months of June, July, August, and part of September, the west and south winds blow, which they call *vendavales*, bringing such rains and storms, that the fields are all overflowed, and they are forced to have little boats to go from one place to another. From October till the middle of December, the north wind prevails; and from that time till May, the east and south-east; which winds are there called *breezes*. Thus there are two seasons in those seas, by the Portuguese called *monzoons*; whence our word *monsoons*, that is, the breezes half the year, with a serene dry air; and the vendavales the other half, wet and stormy. It is further to be observed, that in this climate no vermin breed upon Europeans, though they wear dirty shirts, whereas it is otherwise with the Indians. The days here being always of an equal length, and the weather never cold, neither their clothes, nor the hour of dining, supping, doing business, studying, or praying, are ever changed; nor is cloth worn, but only against the rain.

The air here being, as has been observed, very hot and moist, is not wholesome, but is worse for young men that come from Europe than for the old. As for the natives, without using many precautions, they live very commonly to fourscore or 100. The soil is so rich, that rice grows even on the tops of the mountains without being watered; and this makes it so plentiful, that the Indians value gold so little as not to pick it up, though it lies almost everywhere under their feet.

Among the disadvantages of the island, besides frequent and terrible earthquakes, here are several burning mountains. The face of the island, however, is far from being disfigured by them, or by the consequences of their explosions.

The mountaineers, called *Tingiani*, have no particular place of abode, but always live under the shelter of trees, which serve them instead of houses, and furnish them with food; and when the fruit is eaten up, they remove where there is a fresh sort.

Here are 40 different sorts of palm-trees, the most excellent cocoas, wild cinnamon, wild nutmegs, and some say wild cloves also; ebony; sandal wood; the

Manilla

best cassia, and in such plenty, that they feed their hogs with its fruit; all kinds of cattle, and prodigious quantities of gold, amber, and ambergris.

There are several sorts of people in this island besides the Spaniards, as the Tagalians or Tagaleze, the Pintadoes or painted negroes, the Ilayas or Tinglianos, and the Negrellos. The Tagalians, who are thought to be Malayans by descent, are a modest, tractable, and well-disposed people. The Pintadoes, or painted negroes, are tall, straight, strong, active, and of an excellent disposition. The Tinglianos, whom some suppose to be descended from the Japanese, are very brave, yet very courteous and humane. They live entirely on the gifts of nature; and never sleep under any other shade than that of the trees or a cave. The Negrellos, who are held to be the aborigines of the island, are barbarous and brutal to the last degree. When they kill a Spaniard, they make a cup of his skull and drink out of it.

This island is divided into several provinces, containing divers towns, the chief of which are Manilla, Caceres, New Segovia, Bondo, Passacao, Ibalon, Bulaw, Sersocon, or Bagatao, Lampon, Fernandina, Bolinao, Playahonda, Cavite, Mindora, Caleleya, and Balayan.

MANILLA, the capital of an island of the same name in the East Indies, on the south-east side of the island, where a large river falls into the sea, and forms a noble bay 30 leagues in compass, to which the Spaniards have given the name of *Bahia*, because the river runs out of the great lake Bahi, which lies at the distance of six leagues behind it. In compass it is two miles, in length one-third of a mile; the shape irregular, being narrow at both ends, and wide in the middle. On the south it is washed by the sea, and on the north and east by the river; being also strongly fortified with walls, bastions, forts, and batteries.—Manilla contains about 30,000 souls, who are a very motely race, distinguished by several strange names, and produced by the conjunction of Spaniards, Chinese, Malabars, Blacks, and others inhabiting the city and islands depending on it. Without the walls are large suburbs, particularly that inhabited by the Chinese merchants, called *Sangleys*. In proportion to the size of the place, the number of churches and religious houses is very great. Only small vessels can come up to Manilla; but three leagues south of it is the town and port of Cavite, defended by the castle of St Philip, and capable of receiving the largest ships. Here stands the arsenal where the galleons are built, for which there are from 300 to 600 or 800 men constantly employed, who are relieved every month, and while upon duty are maintained at the king's expence. By an earthquake which happened here in 1645, a third part of the city of Manilla was destroyed, and no less than 3000 people perished in the ruins.

Spain having entered into engagements with France, in consequence of the family-compact of the house of Bourbon, it was found expedient by Britain to declare war also against Spain. Whereupon a force was sent out from our East India settlements particularly Madras, for the conquest of the Philippine islands, under General Draper and Admiral Cornish: who, after a siege of 12 days, took Manilla on the 6th of October 1762 by storm; but to save so fine a city from destruction, agreed to accept a ransom, amounting to a million sterling, a part of which, it is said, was never paid. The Spanish viceroy resides in this city, and lives like a sovereign prince. The government is said to be one of the best in the gift of the king of Spain. When the city was taken, as above, the archbishop, who is a kind of pope in this part of the world, was also viceroy. Five large ships, loaded with the riches of the East, as diamonds from Golconda, cinnamon from Ceylon, pepper from Sumatra and Java, cloves and nutmegs from the Moluccas and Banda islands, camphire from Borneo, benjamin and ivory from Cambodia, silks, tea, and china-ware from China, &c. sail yearly from hence to Acapulco in Mexico, and return freighted with silver, making 400 per cent. profit.

Manilla, Manilius.

The city of Manilla is governed by two alcaides: the rest of the cities and great towns have each an alcaide; and in every village there is a corregidore. Appeals from their sentences are made to the royal court at Manilla, in which there are four judges, and a fiscal or attorney-general; each of these judges has a salary of 3300 pieces of eight per annum. The viceroy is president; and in that quality has an income of 4000 pieces of eight, but he has no vote; yet if the judges are equally divided, the president names a doctor of the civil law, who, in virtue of his appointment, has a decisive vote. The attorney-general, in right of his office, is protector of the Chinese, in consideration of which he receives 600 pieces of eight every year. As for the Indians that are in subjection, they pay tribute in the following proportions: Young men from 18, and from thence, if they continue single, to the age of 60, pay five rials of plate by way of capitation; as single women likewise do from 24 to 50: married men pay ten rials. It is computed that there are within the compass of this government 250,000 Indians subject to his Catholic majesty, of whom two-fifths hold immediately from the king, and the rest from lords or proprietors, who pay two rials each for maintenance of the forces, and the like sum for the parish-priest. The royal revenue is computed at about half a million of pieces of eight, exclusive of casualties. In regard to the military establishment, the garrison of Manilla consists of about 800 or 1000 men, and there are about 3000 more in the Philippines. The viceroy is by his office captain-general, with a salary of about 4000 pieces of eight.

MANILIUS, MARCUS, a Latin poet, whose poem had the ill luck to lie buried in some German libraries, and was not heard of in the world, until Poggius, about two centuries ago, published him from some old manuscripts he found there. There is no account to be found of him but what can be drawn from his poem, which is called *Astronomicon;* and contains a system of the ancient astronomy and astrology, together with the philosophy of the Stoics. It consists of five books; though there was a sixth, which has not been recovered. From the style, and no mention of the author being found in ancient writers, it is probable he died young. It is collected, however, that he was a Roman of illustrious extraction, and lived under the reign of Augustus, whom he invokes, though not by name, yet by circumstances and character that suit no other

Manilius || Manis.

emperor. The best editions of Manilius are, that of Joseph Scaliger, in 1600, and that of Bentley at London in 1738.

MANILLE, in commerce, a large brass ring in the form of a bracelet, either plain or engraven, flat or round.

Manilles are the principal commodities which the Europeans carry to the coast of Africa, and exchange with the natives for slaves. These people wear them as ornaments on the small of the leg, and on the thick part of the arm above the elbow. The great men wear manilles of gold and silver; but these are made in the country by the natives themselves.

MANIOC, or MANIHOT. See JATROPHA, BOTANY *Index*.

MANIPULUS, MANIPULE, among the Romans, was a little body of infantry, which in the time of Romulus consisted of 100 men; and in the time of the consuls, and first Cæsars, of 200.

The word properly signifies "a handful;" and, according to some authors, was first given to the handful of hay which they bore at the end of a pole, to distinguish themselves by, before the custom was introduced of bearing an eagle for their ensign; and hence also the phrase, *a handful of men*. But Vegetius, Modestus, and Varro, give other etymologies of the word: the last derives it from *manus*, a little body of men following the same standard. According to the former, this corps was called *manipulus*, because they fought hand in hand or all together: *Contubernium autem manipulus vocabatur ab eo, quod conjunctis manibus pariter dimicabant.*

Each manipule had two centurions, or captains, called *manipularii*, to command it; one whereof was lieutenant to the other. Each cohort was divided into three manipules, and each manipule into two centuries.

Aulus Gellius quotes an old author, one Cincius, who lived in the time of Hannibal (whose prisoner he was), and who, writing on the art of war, observes, that then each legion consisted of 60 centuries, of 30 manipules, and of ten cohorts. And again, Varro and Vegetius mention it as the least division in the army, only consisting of the tenth part of a century; and Spartian adds, that it contained no more than ten men. This shows that the manipulus was not always the same thing.

MANIPULUS is also an ecclesiastical ornament, worn by the priests, deacons, and subdeacons in the Romish church. It consists of a little fillet in form of a stole, three or four inches broad, and made of the same stuff with the chasuble; signifying and representing an handkerchief which the priests in the primitive church wore on the arm to wipe off the tears they were continually shedding for the sins of the people. There still remains a mark of this usage in a prayer rehearsed by those who wear it; *Merear, Domine, portare manipulum fletus et doloris.*—The Greeks and Maronites wear two manipules, one on each arm.

MANIPULUS, among physicians, is used to signify a handful of herbs or leaves, or so much as a man can grasp in his hand at once; which quantity is frequently denoted by the abbreviature, M, or m.

MANIS, the SCALY LIZARD, a genus of quadrupeds belonging to the order of bruta. See MAMMALIA *Index*.

Manis || Manna.

MANLEY, MRS, the celebrated writer of the *Atalantis*, was the daughter of Sir Roger Manley, the reputed author of the first volume of the Turkish Spy. She lost her parents very early; and after having been deluded into a false marriage by her guardian, who was her cousin, and afterwards deserted her, she was patronized by the duchess of Cleveland, mistress of Charles II. But the duchess, being a woman of a very fickle temper, grew tired of Mrs Manley in six months time; and discharged her upon a pretence, whether groundless or not is uncertain, that she intrigued with her son. After this she wrote her first tragedy, called Royal Mischief, which was acted with great applause in 1696; and her apartment being frequented by men of wit and gaiety, she soon engaged in amours, and was taken into keeping. Her pen now grew as licentious as her conduct; for, in her retired hours, she wrote four volumes, called Memoirs of the New Atalantis; in which she was not only very free in her wanton tales of love adventures, but satirized the characters of many distinguished personages, especially those who had a principal concern in the Revolution. A prosecution was commenced against her for this work; but whether those in power were ashamed to bring a woman to trial for a few amorous trifles; or whether the laws could not reach her disguised satire, she was discharged; and a total change of the ministry ensuing, Mrs Manley lived in high reputation and gaiety, amusing herself with the conversation of wits, and writing plays, poems, and letters. She died in 1724.

MANLIUS CAPITOLINUS, the renowned Roman consul and general, who saved the capitol when it was attacked by the Gauls in the night: he was alarmed by the cries of geese, which were ever after held sacred. But being afterwards accused of aspiring at the sovereignty, he was thrown from the Tarpeian rock. See GAUL and ROME.

MANLIUS *Torquatus*, a celebrated consul and Roman captain; had great wit, but a difficulty in expressing himself, which induced Manlius Imperiosus, his father, to keep him almost by force in the country. Pompey, tribune of the people, enraged at this instance of severity, formed a design of accusing Manlius the father before the judges; but Torquatus being informed of it, went to that tribune, and, with a poniard in his hand, made him swear, that he would not proceed in that accusation against him to whom he owed his life. At length Torquatus was made military tribune, and killed a soldier of the Gauls in single combat, from whom he took a gold chain that he wore about his neck. From this action he obtained the name of *Torquatus*. He was consul in the war against the Latins; when he ordered his own son to be beheaded for fighting contrary to his orders, though he had gained the victory. He conquered the enemies of the republic, and was several times made consul; but at last refused the consulship, saying, That it was no more possible for him to bear with the vices of the people, than it was for the people to bear with his severity.

MANNA, in the *Materia Medica*, the juice of certain

Manna. tain trees of the ash kind, either naturally concreted on the plants, or exsiccated and purified by art. See MATERIA MEDICA *Index*.

MANNA, is also a Scripture term, signifying a miraculous kind of food which fell from heaven for the support of the Israelites in their passage through the wilderness, being in form of coriander seeds, its colour like that of bdellium, and its taste like honey.

The Scripture gives to manna the name of the *bread of heaven*, and the *food of angels*, Psalm lxxviii. 25. whether it would insinuate to us, that the angels sent and prepared this food, or that angels themselves, if they had need of any food, could not have any that was more agreeable than manna was. The author of the Book of Wisdom says, xvi. 20, 21. that manna so accommodated itself to every one's taste, that every one found it pleasing to him; and that it included every thing that was agreeable to the palate and fit for good nourishment; which expressions some have taken in the literal sense, though others understand them figuratively.

The critics are divided about the original of the word *manna*. Some think that *man* is put instead of the Hebrew word *mah*, which signifies "What is this?" and that the Hebrews, then first seeing that new food which God had sent them, cried to one another, מן הוא, *man-hu*, instead of *mah-hu*, "What is this?" Others maintain, that the Hebrews very well knew before what manna was; and that, seeing it in great abundance about their camp, they said one to another, *Man-hu*, "This is manna." Mr Saumaise and some other moderns are of this last opinion. They imagine, that the manna which God sent the Israelites was nothing else but that fat and thick dew which still falls in Arabia, which presently condensed, and served for food to the people; that this is the same thing as the wild honey, mentioned Matth. iii. 4. wherewith John the Baptist was fed; and that the miracle of Moses did not consist in the production of any new substance, but in the exact and uniform manner in which the manna was dispensed by Providence for the maintenance of such a great multitude.

On the contrary, the Hebrews and Orientals believe, that the fall of the manna was wholly miraculous. The Arabians call it the *sugar plums of the Almighty;* and the Jews are so jealous of this miracle, that they pronounce a curse against all such as presume to deny the interposition of a miraculous power.

Our translation, and some others, make Moses fall into a plain contradiction in relating this story of the manna, which they render thus: "And when the children of Israel saw it, they said one to another, It is manna; for they wist not what it was." Exodus xvi. 15. Whereas the Septuagint and several authors both ancient and modern have translated the text according to the original, "The Israelites seeing this, said one to another, What is this? for they knew not what it was." For we must observe, that the word by which they asked, *what is this?* was in their language *man*, which signifies likewise meat, ready provided; and therefore it was always afterwards called *man* or *manna*.

Whether this manna had those extraordinary qualities in it or not, which some imagine, it must be allowed to be truly miraculous, upon the following accounts. 1. That it fell but six days in the week. 2. That it fell in such a prodigious quantity, as sustained almost three millions of souls. 3. That there fell a double quantity every Friday, to serve them for the next day, which was their Sabbath. 4. That what was gathered on the first five days stunk and bred worms if kept above one day: but that which was gathered on Friday kept sweet for two days. And, lastly, That it continued falling while the Israelites abode in the wilderness, but ceased as soon as they came out of it and had got corn to eat in the land of Canaan. Manna || Manners.

MANNA-Tree, is a species of the ash, and a native of Calabria in Italy. See FRAXINUS, BOTANY *Index*, and MATERIA MEDICA *Index*.

MANNER, in painting, a habitude that a man acquires in the three principal parts of painting, the management of colours, lights, and shadows; which is either good or bad according as the painter has practised more or less after the truth, with judgment and study. But the best painter is he who has no manner at all. The good or bad choice he makes is called *goute*.

MANNERS, the plural noun, has various significations; as the general way of life, the morals, or the habits, of any person or people; also ceremonious behaviour, or studied civility. See the next article.

Good MANNERS, according to Swift, is the art of making those people easy with whom we converse.

Whoever makes the fewest persons uneasy, is the best bred in the company.

As the best law is founded upon reason, so are the best manners. And as some lawyers have introduced unreasonable things into common law; so likewise many teachers have introduced absurd things into common good manners.

One principal point of this art is to suit our behaviour to the three several degrees of men; our superiors, our equals, and those below us.

For instance, to press either of the two former to eat or drink is a breach of manners; but a tradesman or a farmer must be thus treated, or else it will be difficult to persuade them that they are welcome.

Pride, ill nature, and want of sense, are the three great sources of ill manners; without some one of these defects, no man will behave himself ill for want of experience; or of what, in the language of fools, is called *knowing the world*.

"I defy (proceeds our author), any one to assign an incident wherein reason will not direct us what we are to say or to do in company, if we are not misled by pride or ill nature. Therefore, I insist that good sense is the principal foundation of good manners; but because the former is a gift which very few among mankind are possessed of, therefore all the civilized nations of the world have agreed upon fixing some rules for common behaviour, best suited to their general customs, or fancies, as a kind of artificial good sense to supply the defects of reason. Without which the gentlemanly part of dunces would be perpetually at cuffs, as they seldom fail when they happen to be drunk, or engaged in squabbles about women or play. And, God be thanked, there hardly happeneth a duel in a year, which may not be imputed to one of those three motives. Upon which account, I should be exceedingly sorry to find the legislature make any new laws against

Manners. against the practice of duelling; because the methods are easy, and many, for a wise man to avoid a quarrel with honour, or engage in it with innocence. And I can discover no political evil, in suffering bullies, sharpers, and rakes, to rid the world of each other by a method of their own, where the law hath not been able to find an expedient.

"As the common forms of good manners were intended for regulating the conduct of those who have weak understandings; so they have been corrupted by the persons for whose use they were contrived. For these people have fallen into a needless and endless way of multiplying ceremonies, which have been extremely troublesome to those who practise them, and insupportable to every body else; insomuch that wise men are often more uneasy at the over civility of these refiners, than they could possibly be in the conversations of peasants or mechanics.

"The impertinences of this ceremonial behaviour, are nowhere better seen than at those tables, where ladies preside who value themselves upon account of their good breeding; where a man must reckon upon passing an hour without doing any one thing he hath a mind to, unless he will be so hardy as to break through all the settled decorum of the family. She determines what he loveth best, and how much he shall eat; and if the master of the house happeneth to be of the same disposition, he proceedeth in the same tyrannical manner to prescribe in the drinking part: at the same time you are under the necessity of answering a thousand apologies for your entertainment. And although a good deal of this humour is pretty well worn off among many people of the best fashion, yet too much of it still remaineth, especially in the country; where an honest gentleman assured me, that having been kept four days against his will at a friend's house, with all the circumstances of hiding his boots, locking up the stable, and other contrivances of the like nature, he could not remember, from the moment he came into the house to the moment he left it, any one thing wherein his inclination was not directly contradicted; as if the whole family had entered into a combination to torment him.

"But, besides all this, it would be endless to recount the many foolish and ridiculous accidents I have observed among these unfortunate proselytes to ceremony. I have seen a duchess fairly knocked down by the precipitancy of an officious coxcomb running to save her the trouble of opening the door. I remember, upon a birth-day at court, a great lady was rendered utterly disconsolate, by a dish of sauce let fall by a page directly upon her head-dress and brocade, while she gave a sudden turn to her elbow upon some point of ceremony with the person who sat next her. Monsieur Buys, the Dutch envoy, whose politics and manners were much of a size, brought a son with him about 13 years old to a great table at court. The boy and his father, whatever they put on their plates, they first offered round in order, to every person in the company; so that we could not get a minute's quiet during the whole dinner. At last their two plates happened to encounter, and with so much violence, that, being china, they broke in twenty pieces, and stained half the company with wet sweatmeats and cream.

"There is a pedantry in manners as in all arts and sciences, and sometimes in trades. Pedantry is properly the overrating any kind of knowledge we pretend to. And if that kind of knowledge be a trifle in itself, the pedantry is the greater. For which reason I look upon fiddlers, dancing-masters, heralds, masters of the ceremony, &c. to be greater pedants than Lipsius, or the elder Scaliger. With these kinds of pedants the court, while I knew it, was always plentifully stocked: I mean from the gentleman-usher (at least) inclusive, downward to the gentleman-porter; who are, generally speaking, the most insignificant race of people that this island can afford, and with the smallest tincture of good manners, which is the only trade they profess. For being wholly illiterate, conversing chiefly with each other, they reduce the whole system of breeding within the forms and circles of their several offices: and as they are below the notice of ministers, they live and die in court under all revolutions, with great obsequiousness to those who are in any degree of credit or favour, and with rudeness and insolence to every body else. From whence I have long concluded, that good manners are not a plant of the court growth: for if they were, those people who have understandings directly of a level for such acquirements, and who have served such long apprenticeships to nothing else, would certainly have picked them up. For as to the great officers who attend the prince's person or councils, or preside in his family, they are a transient body, who have no better a title to good manners than their neighbours, nor will probably have recourse to gentlemen-ushers for instruction. So that I know little to be learned at court on this head, except in the material circumstance of dress; wherein the authority of the maids of honour must indeed be allowed to be almost equal to that of a favourite actress.

"I remember a passage my Lord Bolingbroke told me: That going to receive Prince Eugene of Savoy at his landing, in order to conduct him immediately to the queen, the prince said he was much concerned that he could not see her majesty that night; for Monsieur Hoffman (who was then by) had assured his highness, that he could not be admitted into her presence with a tied-up periwig; that his equipage was not arrived; and that he had endeavoured in vain to borrow a long one among all his valets and pages. My lord turned the matter to a jest, and brought the prince to her majesty: for which he was highly censured by the whole tribe of gentlemen ushers; among whom Monsieur Hoffman, an old dull resident of the emperor's, had picked up this material point of ceremony; and which, I believe, was the best lesson he had learned in 25 years residence.

"I make a difference between *good manners* and *good breeding*; although, in order to vary my expression, I am sometimes forced to confound them. By the first, I only understand the art of remembering, and applying, certain settled forms of general behaviour. But *good breeding* is of a much larger extent: for besides an uncommon degree of literature sufficient to qualify a gentleman for reading a play, or a political pamphlet, it taketh in a great compass of knowledge; no less than that of dancing, fighting, gaming, making the circle of Italy, riding the great horse, and speaking French; not to mention some other secondary or subaltern accomplishments, which are more ea-

sily

Manners, Mannory.

sily acquired. So that the difference between good breeding and good manners lieth in this, That the former cannot be attained to by the best understandings without study and labour; whereas a tolerable degree of reason will instruct us in every part of good manners without other assistance.

"I can think of nothing more useful upon this subject, than to point out some particulars wherein the very essentials of good manners are concerned, the neglect or perverting of which doth very much disturb the good commerce of the world, by introducing a traffic of a mutual uneasiness in most companies.

"First, A necessary part of good manners is a punctual observance of time at our own dwellings or those of others, or at third places; whether upon matters of civility, business, or diversion; which rule, though it be a plain dictate of common reason, yet the greatest minister* I ever knew, was the greatest trespasser against it; by which all his business doubled upon him, and placed him in a continual arrear. Upon which I often used to rally him as deficient in point of good manners. I have known more than one ambassador, and secretary of state, with a very moderate portion of intellectuals, execute their offices with great success and applause, by the mere force of exactness and regularity. If you duly observe time for the service of another, it doubles the obligation; if upon your own account, it would be manifest folly, as well as ingratitude, to neglect it; if both are concerned, to make your equal or inferior attend on you to his own disadvantage, is pride and injustice.

Harley arl of Oxford, lord igh treasurer to Queen nne.

"Ignorance of forms cannot properly be styled *ill manners:* because forms are subject to frequent changes; and consequently, being not founded upon reason, are beneath a wise man's regard. Besides, they vary in every country; and after a short period of time vary frequently in the same: so that a man who travelleth must needs be at first a stranger to them in every court through which he passeth; and, perhaps, at his return, as much a stranger in his own; and, after all, they are easier to be remembered or forgotten than faces or names.

"Indeed, among the many impertinencies that superficial young men bring with them from abroad, this bigotry of forms is one of the principal, and more predominant than the rest; who look upon them not only as if they were matters capable of admitting of choice, but even as points of importance; and therefore are zealous upon all occasions to introduce and propagate the new forms and fashions they have brought back with them: so that, usually speaking, the worst bred person in the company is a young traveller just arrived from abroad."

MANNORY, Lewis, advocate of the parliament of Paris, where he was born in 1696, and died in 1777. From him we have 18 vols. 12mo. of *Pleadings* and *Memoirs*. A great number of singular cases occur in this collection: and the author has the talent of rendering them more striking by the agreeable manner in which they are stated. He was Travenol's counsel in his process against Voltaire, and was very satirical against that poet. The latter took revenge by describing him as a mercenary babbler, who sold his pen and his abuse to the highest bidder. Whatever may be the case, Mannory would certainly have been more esteemed, both as an advocate and as a writer, if he had paid more attention to his style, and had been less prolix; if he had thought more deeply, and been more sparing of his pleasantry in cases where nothing was required but knowledge and sound reasoning. He published also a translation into French of Father Parée's funeral Oration on Louis XIV. and very judicious Observations on the Semiramis of Voltaire.

Mannory || Manometer.

MANOEUVRE, in a military sense, consists solely in distributing equal motion to every part of a body of troops, to enable the whole to form, or change their position, in the most expeditious and best method, to answer the purposes required of a battalion, brigade, or line of cavalry, artillery, or infantry. It has always been lamented, that men have been brought on service without being informed of the uses of the different manœuvres they have been practising; and having no ideas of any thing but the uniformity of the parade, instantly fall into disorder and confusion when they lose the step, or see a deviation from the straight lines they have been accustomed to at exercise. It is a pity to see so much attention given to show, and so little to instruct the troops in what may be of use to them in real service. No manœuvre should be executed in presence of the enemy, unless protected by some division of the troops.

MANOMETER, or Manoscope, an instrument to show or measure the alterations in the rarity or density of the air. The manometer differs from the barometer in this, That the latter only serves to measure the *weight* of the atmosphere, or of the column of air over it; but the former, the density of the air in which it is found; which density depends not only on the weight of the atmosphere, but also on the action of heat and cold, &c. Authors, however, generally confound the two together; and Mr Boyle himself gives us a very good manometer of his contrivance, under the name of a *statical barometer*, consisting of a bubble of thin glass, about the size of an orange, which, being counterpoised when the air was in a mean state of density, by means of a nice pair of scales, sunk when the atmosphere became lighter, and rose as it grew heavier.

Other kinds of manometers were made use of by Colonel Roy, in his attempts to correct the errors of the barometer. "They were (says he) of various lengths, from four to upwards of eight feet: they consisted of straight tubes, whose bores were commonly from $\frac{1}{13}$th to $\frac{1}{23}$th of an inch in diameter. The capacity of the tube was carefully measured, by making a column of quicksilver, about three or four inches in length, move along it from one end to the other. These spaces were severally marked with a fine edged file, on the tubes; and transferred from them to long slips of pasteboard, for the subsequent construction of the scales respectively belonging to each. The bulb, attached to one end of the manometer at the glass-house, was of the form of a pear, whose point being occasionally opened, dry or moist air could be readily admitted, and the bulb sealed again, without any sensible alteration in its capacity.

"The air was confined by means of a column of quicksilver, long or short, and with the bulb downward or upwards, according to the nature of the proposed experiment. Here it must be observed, that, from

Manometer.

from the adhesion of the quicksilver to the tube, the instrument will not act truly, except it be in a vertical position; and even then it is necessary to give it a small degree of motion, to bring the quicksilver into its true place; where it will remain in equilibrio, between the exterior pressure of the atmosphere on one side, and the interior elastic force of the confined air on the other.

"Pounded ice and water were used to fix a freezing point on the tube; and by means of salt and ice, the air was farther condensed, generally four, and sometimes five or six degrees below zero. The thermometer and manometer were then placed in a tin vessel among water, which was brought into violent ebullition; where, having remained a sufficient time, and motion being given to the manometer, a boiling point was marked thereon. After this the fire was removed, and the gradual descents of the piece of quicksilver, corresponding to every 20 degrees of temperature in the thermometer, were successively marked on a deal rod applied to the manometer. It is to be observed, that both instruments, while in the water, were in circumstances perfectly similar; that is to say, the ball and bulb were at the bottom of the vessel.

"In order to be certain that no air had escaped by the side of the quicksilver during the operation, the manometer was frequently placed a second time in melting ice. If the barometer had not altered between the beginning and end of the experiment, the quicksilver always became stationary at or near the first mark. If any sudden change had taken place in the weight of the atmosphere during that interval, the same was noted, and allowance made for it in afterwards proportioning the spaces.

"Long tubes, with bores truly cylindrical, or of any uniform figure, are scarcely ever met with. Such however as were used in these experiments, generally tapered in a pretty regular manner from one end to the other. When the bulb was downwards, and the tube narrowed that way, the column of quicksilver confining the air lengthened in the lower half of the scale, and augmented the pressure above the mean. In the upper half, the column being shortened, the pressure was diminished below the mean. In this case, the observed spaces both ways from the centre were diminished in the inverse ratio of the heights of the barometer at each space, compared with its mean height. If the bore widened towards the bulb when downwards, the observed spaces, each way from the centre, were augmented in the same inverse ratio; but in the experiments on air less dense than the atmosphere, the bulb being upwards, the same equation was applied with contrary signs: and if any extraordinary irregularity took place in the tube, the corresponding spaces were proportioned both ways from that point, whether high or low, that answered to the mean.

"The observed and equated manometrical spaces being thus laid down on the pasteboard containing the measures of the tube; the 212° of the thermometer, in exact proportion to the sections of the bore, were constructed alongside of them: hence the coincidences with each other were easily seen; and the number of thermometrical degrees answering to each manometrical space readily transferred into a table prepared for the purpose*."

Manometer, Manor.

MANOMETER, for the air pump. This is a small glass tube about two or three inches high, hermetically sealed at one end, and open at the other, being divided regularly into inches and lines. It is used for ascertaining the rarefaction of the air produced by working an *air pump*. The tube previously filled with mercury, is placed in the receiver of an air pump. As the piston is worked, the mercury gradually sinks in the tube, and the expansion is estimated by its height; for the smaller the height at which the mercury in the tube stands above the mercury in the bason, the greater is the expansion.

* *Phil. Trans.* lxvii. 685

MANOR, MANERIUM (*à manendo*, because the usual residence of the owner), seems to have been a district of ground held by lords or great personages; who kept in their own hands so much land as was necessary for the use of their families, which were called *terræ dominicales*, or *demesne lands*; being occupied by the lord, as *dominus manerii*, and his servants. The other, or *tenemental* lands, they distributed among their tenants; which, from the different modes of tenure, were called and distinguished by two different names.—First, *book-land*, or charter land, which was held by deed under certain rents and free services, and in effect differed nothing from free socage lands: and from hence have arisen most of the freehold tenants who hold of particular manors, and owe suit and service to the same. The other species was called *folk-land*, which was held by no assurance in writing, but distributed among the common folk, or people, at the pleasure of the lord, and resumed at his discretion; being indeed land held in villenage. See VILLENAGE. *Blackst. Comment.*

The residue of the manor, being uncultivated, was termed the *lord's waste*, and served for public roads, and for common of pasture to the lord and his tenants. Manors were formerly called *baronies*, as they still are *lordships*; and each lord or baron was empowered to hold a domestic court, called the *court baron*, for redressing misdemesnors and nusances within the manor, and for settling disputes of property among the tenants. This court is an inseparable ingredient of every manor; and if the number of suitors should so fail, as not to leave sufficient to make a jury or homage, that is, two tenants at the least, the manor itself is lost.

In the early times of our legal constitution, the king's greater barons, who had a large extent of territory held under the crown, granted out frequently smaller manors to inferior persons to be held of themselves; which do therefore now continue to be held under a superior lord, who is called in such cases the *lord paramount* over all these manors; and his seignory is frequently termed an *honour*, not a *manor*; especially if it hath belonged to an ancient feodal baron, or hath been at any time in the hands of the crown. In imitation whereof, these inferior lords began to carve out and grant to others still more minute estates to be held as of themselves, and were so proceeding downwards *in infinitum*, till the superior lords observed, that, by this method of subinfeudation, they lost all their feodal profits of wardships, marriages, and escheats,

Manor || Mansfeld.

cheats, which fell into the hands of these mesne or middle lords, who were the immediate superiors of the *terre tenant*, or him who occupied the land; and also that the mesne lords themselves were so impoverished thereby, that they were disabled from performing their services to their own superiors. This occasioned, first, that provision in the 33d chapter of *magna charta*, 9 Hen. III. (which is not to be found in the first chapter granted by that prince, nor in the great charter of King John), that no man should either give or sell his land without reserving sufficient to answer the demands of his lord; and, afterwards, the statute of Westm. 3. or *quia emptores*, 18 Edw. I. c. 1. which directs, that, upon all sales, or feoffments of land, the feoffee shall hold the same, not of his immediate feoffor, but of the chief lord of the fee, of whom such feoffer himself held it. But these provisions not extending to the king's own tenants *in capite*, the like law concerning them is declared by the statutes of *prærogativa regis*, 17 Edward II. c. 6. and of 34 Edw. III. c. 15. by which last all subinfeudations, previous to the reign of King Edward I. were confirmed; but all subsequent to that period were left open to the king's prerogative. And from hence it is clear, that all manors existing at this day, must have existed as early as King Edward the First: for it is essential to a manor, that there be tenants who hold of the lord; and, by the operation of these statutes, no tenant *in capite* since the accession of that prince, and no tenant of a common lord since the statute of *quia emptores*, could create any new tenant to hold of himself. See VILLENAGE.

MANS, a town of France, formerly capital of the county of Maine, with a bishop's see, and 17,000 inhabitants. Its wax and stuffs are famous. It is seated on a high hill near the river Sarte, in E. Long. 0. 17. N. Lat. 48.

MANSE, MANSUS, *Mansa*, or *Mansum*; in ancient law-books, denotes a *house*, or habitation, either with or without land. See HOUSE and MANSION. The word is formed *à manendo*, "abiding;" as being the place of dwelling or residence.

Capital MANSE, (*Mansum Capitale*), denotes the *manor-house*, or lord's court. See MANOR.

Mansus Presbyteri, is a parsonage or vicarage house for the incumbent to reside in. This was originally, and still remains, an essential part of the endowment of a parish church, together with the glebe and tythes. It is sometimes called *Presbyterium*. See PRESBYTERY.

MANSFELD, a city of Germany, and capital of a county of the same name, in the circle of Upper Saxony. E. Long. 11. 41. N. Lat. 51. 38.

MANSFELD, *Peter Ernest, Count of*, was descended from one of the most illustrious families in Germany, and which has produced the greatest number of distinguished characters. In 1552, he was taken prisoner at Ivry, where he commanded; and he was afterwards of great service to the Catholics at the battle of Montcontour. In consequence of his great talents, he was employed in affairs of the utmost delicacy and importance. Being made governor of Luxemburg, he maintained tranquillity in that province, while the rest of the Low Countries was a prey to the horrors of civil war. In testimony of their gratitude, the States caused the following inscription to be placed on the gate of the hotel de ville: *In Belgio omnia dum vastat civile bellum, MANSFELDUS bello et pace fidus, hanc provinciam in fide continet servatque illæsam, cum summo populi consensu et hilari jucunditate.* He was afterwards appointed to the command of the Low Countries; and died at Luxemburg, March 21. 1604, at the age of 87, with the title of *Prince of the Holy Empire*. His mausoleum, in bronze, which is to be seen in the chapel bearing his name, and adjoining to the church of the Recollects at Luxemburg, is an admirable work. Four highly finished weepers, with which this monument was ornamented, were carried off by Louis XIV. when he took this city in 1684. To a love of war, Mansfeld united a taste for the sciences; and he was a lover and encourager of the arts: he possessed a great and elevated mind; but, like many heroes ancient and modern, he was greedy of gain and lavish of blood. Abbé Schannat has written the history of the count of Mansfeld in Latin; printed at Luxemburg, 1707. Charles prince of Mansfeld, his lawful son, signalized himself in the wars of Flanders and Hungary; and died without issue in 1595, after having beaten the Turks who attempted to relieve the city of Gran (Strigonia), which he was besieging. Mansfeld.

MANSFELD, *Ernest de*, the illegitimate son of Peter Ernest by a lady of Malines, was educated at Brussels, in the principles of the Roman Catholic religion, by his godfather Ernest archduke of Austria. He was employed in the service of the king of Spain in the Low Countries, and in that of the emperor in Hungary, together with his brother Charles, count of Mansfeld. He was legitimated on account of his bravery by the emperor Rodolphus II.; but his father's posts and possessions in the Spanish Netherlands having been refused him, contrary to promises which he had received, he, in 1610, joined the party of the Protestant princes. Being now become one of the most dangerous enemies of the house of Austria, who called him the *Attila of Christianity*, he set himself, in 1618, at the head of the rebels in Bohemia, and got possession of Pilsen in 1619. Though his troops were defeated in several battles, he was able to penetrate into the palatinate. He there took several places, ravaged Alsace, made himself master of Haguenau, and defeated the Bavarians. At length he was totally defeated by Walstein, at the battle of Dassou, which happened in the month of April 1626. He gave over his remaining troops to the duke of Weimar, and intended to pass into the Venetian states; but fell sick in a village between Zaro and Spalatro, and there expired, A. D 1626, aged 46. The procurator Nani thus describes him: "He was bold, intrepid in danger, and the most skilful negotiator of the age in which he lived. He possessed a natural eloquence, and well knew how to insinuate himself into the hearts of those whom he wished to gain. He was greedy of others wealth, and prodigal of his own.—He was full of vast projects and great hopes, and yet possessed neither lands nor money at his death." He did not wish to die in his bed; but dressed himself in his finest robes, put on his sword, sat up, leaning upon two domestics, and in this position, highly becoming a warrior, breathed his last. But of all the

Mansfeld || Manslaughter.

actions of this great captain and singular man, the following is without doubt the most extraordinary: Having got the most certain information that Cazel, in whom of all his officers he placed the greatest confidence, had communicated his plans to the Austrian chief, he showed neither passion nor resentment at his treachery, but gave him 300 rix-dollars, and sent him to Count Buquoy, with a letter expressed in these words: "Cazel being attached to you and not to me, I send him to you, that you may have the benefit of his services." The opinions of men were divided about this action, and it was as much censured as applauded. Be this as it may, Ernest is deservedly esteemed one of the greatest generals of his age. There never was a leader more patient, more indefatigable, more inured to toil and hardship, to watchings, to colds and to hunger. He raised armies, and ravaged the enemy's territories with an incredible celerity. The Hollanders said of him, that he was *bonus in auxilio, carus in pretio;* that is, that he rendered great services to those who employed him, but that he made them pay well for it.

MANSFIELD, a town of Nottinghamshire, in England, seated in the forest of Sherwood, 140 miles from London. It was anciently a royal demesne. It has a market on Thursdays, and two fairs. By an ancient custom of this manor, the heirs were declared of age as soon as born. It is a well-built town, and has a great trade in malt. Its market is well stocked with corn, cattle, &c. Here is a charity school for 36 boys. The population in 1811 was 6816.

MANSIO, a term often mentioned in itineraries, denoting *inns* on the public roads to lodge in, at the distance of eighteen miles from each other; (Lactantius). Also, in the lower ages, it came to denote "an encampment for one night," (Lampridius).

MANSIO, or *Mansus*, was sometimes also used in the same sense with *hide;* that is, for as much land as one plough could till in a year. See HIDE.

MANSION, MANSIO, a dwelling house, or habitation, especially in the country. See MANSE.

MANSION is more particularly used for the lord's chief dwelling house within his fee; otherwise called the *capital messuage* or *manse*, or chief manor-place. See MANOR.

MANSLAUGHTER, the unlawful killing of another, without malice either express or implied: Which may be either voluntary, upon a sudden heat; or involuntary, but in the commission of some unlawful act. These were called, in the Gothic constitutions, *homicidia vulgaria; quæ aut casu, aut etiam sponte committuntur, sed in subitaneo quodam iracundiæ calore et impetu.* And hence it follows, that in manslaughter there can be no accessories before the fact; because it must be done without premeditation.

1. As to the first, or voluntary branch: If upon a sudden quarrel two persons fight, and one of them kills the other, this is manslaughter: and so it is, if they upon such an occasion go out and fight in a field; for this is one continued act of passion; and the law pays that regard to human frailty, as not to put a hasty and deliberate act upon the same footing with regard to guilt. So also if a man be greatly provoked, as by pulling his nose, or other great indignity, and immediately kills the aggressor; though this is not excusable *se defendendo,* since there is no absolute necessity for doing it to preserve himself; yet neither is it murder, for there is no previous malice; but it is manslaughter. But in this, and in every other case of homicide upon provocation; if there be a sufficient cooling-time for passion to subside and reason to interpose, and the person so provoked afterwards kills the other, this is deliberate revenge, and not heat of blood; and accordingly amounts to murder. So if a man takes another in the act of adultery with his wife, and kills him directly upon the spot; though this was allowed by the law of Solon, as likewise by the Roman civil law (if the adulterer was found in the husband's own house), and also among the ancient Goths; yet in England it is not absolutely ranked in the class of justifiable homicide, as in case of a forcible rape, but it is manslaughter. It is, however, the lowest degree of it; and therefore in such a case the court directed the burning in the hand to be gently inflicted, because there could not be a greater provocation. Manslaughter, therefore, on a sudden provocation, differs from excusable homicide *se defendendo* in this: That in the one case there is apparent necessity, for self-preservation, to kill the aggressor; in the other no necessity at all, being only a sudden act of revenge. Manslaughter

2. The second branch, or involuntary manslaughter, differs also from homicide excusable by misadventure, in this: That misadventure always happens in consequence of a lawful act, but this species of manslaughter in consequence of an unlawful one. As if two persons play at sword and buckler, unless by the king's command, and one of them kills the other; this is manslaughter, because the original act was unlawful; but it is not murder, for the one had no intent to do the other any personal mischief. So where a person does an act, lawful in itself, but in an unlawful manner, and without due caution and circumspection; as when a workman flings down a stone or piece of timber into the street, and kills a man; this may be either misadventure, manslaughter, or murder according to the circumstances under which the original act was done. If it were in a country village, where few passengers are, and he calls out to all people to have a care, it is misadventure only; but if it were in London, or other populous towns, where people are continually passing, it is manslaughter, though he gives loud warning; and murder, if he knows of their passing and gives no warning at all, for then it is malice against all mankind. And, in general, when an involuntary killing happens in consequence of an unlawful act, it will be either murder or manslaughter according to the nature of the act which occasioned it. If it be in prosecution of a felonious intent, or in its consequences naturally tending to bloodshed, it will be murder; but if no more was intended than a mere civil trespass, it will only amount to manslaughter

3. As to the punishment of this degree of homicide: The crime of manslaughter amounts to felony, but within the benefit of clergy; and the offender shall be burnt in the hand, and forfeit all his goods and chattels.

But there is one species of manslaughter, which is punished as murder, the benefit of clergy being taken away from it by statute; namely, the offence of mortally

Man-slaughter || Manticho-ra.

tally stabbing another, though done upon sudden provocation. See STABBING.

MANTA, in *Ichthyology;* a flat fish mentioned by Ulloa and others, as exceedingly hurtful to the pearl-fishers, and which seems to be the same with that which Pliny has described under the name of *nubes* or *nebula: Ipsi ferunt* (Urinatores) *et nubem quandam crassescere super capita, planorum piscium similem, prementem eos, arcentemque à reciprocando, et ob stilos præacutos lineis annexos habere sese; quia nisi perfossæ ita, non resedant caliginis et pavoris, ut arbitror, opere. Nubem enim sive nebulam (cujus nomine id malum appellunt) inter animalia haud ullam reperit quisquam.* (Plin. Hist. lib. ix. cap. 46.). The account given of this *cloud* by those divers is much the same with that which the divers in the American seas give of the manta; and the name of the cloud is perfectly applicable to it, as it really seems to be a cloud to those who are in the water below it: the swimmers likewise carry long knives, or sharp sticks, for the purpose of dispersing this animal. It it is not improbable, that this fish has made its way into those seas from those of the old world, in the same manner as some others appear to have done. The strength of this fish is so great, that it will not only strangle a man whom it embraces or winds itself about, but it has even been seen to take the cable of an anchor and move it from the place where it had been cast. It has been called *manta*, because, when it lies stretched upon the sea, as it frequently does, it seems like a fleece of wool floating upon the water.

MANTE, a considerable town of France, capital of the Mantois, seated on the river Seine, in E. Long. 1. 45. N. Lat. 48. 58.

MANTEGAR, or MAN-TIGER, as it is sometimes written, is the tufted ape, a species of simia. See MAMMALIA *Index*.

MANTEGNA, ANDREW, was born in a village near Padua in 1451, and at first employed in keeping sheep. It was observed, that instead of watching over his flock, he amused himself with drawing; and he was placed with a painter who, being delighted with his ease and taste in work, and with his gentle and agreeable conduct in society, adopted him for his son, and made him his heir. At the age of 17, Mantegna was employed to paint the altar of St Sophia in Padua, and the four evangelists. James Bellini, who admired his talents, gave him his daughter in marriage. Mantegna painted, for the duke of Mantua, the *Triumph of Cæsar*, which is the chief d'oeuvre of this painter, and has been engraved in claro-obscuro, in nine plates. From respect to his extraordinary merit, the duke made him knight of his order. The invention of engraving prints with the graver is commonly ascribed to Mantegna, who died at Mantua in 1517.

MANTELETS, in the art of war, a kind of moveable parapets, made of planks about three inches thick, nailed one over another, to the height of almost six feet, generally cased with tin, and set upon little wheels, so that in a siege they may be driven before the pioneers, and serve as blinds to shelter them from the enemy's small shot.

MANTICHORA, a name given by the Roman authors to a fierce and terrible creature, which they describe from the Greeks, who call it sometimes also *mantichora*, *martichora*, and *martiora*. We have formed the name *man-tiger* on the sound of the Roman name, though expressing a very different sense; and our authors of the histories of animals, figure to us under this name a terrible creature, partly from the accounts of Pliny exaggerated, and partly from their own imagination, with three rows of teeth, and with such a shape as no animal ever possessed. See MANTEGAR.

Manti-chora || Mantua.

MANTINEA, in *Ancient Geography*, a town situated in the south of Arcadia, on the confines of Laconia (Ptolemy); called afterwards *Antigonea*, in honour of King Antigonus. It is memorable for a battle fought in its neighbourhood between the Thebans and Spartans, in which fell the celebrated commander Epaminondas. See THEBES.

MANTIS, a genus of insects belonging to the order of hemiptera. See ENTOMOLOGY *Index*.

MANTLE, or *MANTLE Tree*, in *Architecture*, the lower part of the chimney, or that piece of timber which is laid across the jambs, and sustains the compartments of the chimney-piece.

MANTLE, or *Mantling*, in *Heraldry*, that appearance of folding of cloth, flourishing, or drapery, which in any achievement is drawn about a coat of arms. See HERALDRY, sect. v.

MANTO, in poetic history, the daughter of Tiresias, and like her father strongly inspired with prophecy. She was in so great esteem, that when the Argives pillaged Thebes, they thought they could not acquit their vow to Apollo, of consecrating to him the most precious thing in their plunder, without offering him this young woman. She was therefore sent to the temple of Delphi. But this did not engage her in any vow of continency; or, if it did, she observed it very ill: for she bore a son called *Amphilochus* to Alcmeon, who had been generalissimo of the army which took Thebes; and a daughter to the same, named *Tisiphone*. These children were the fruits of an amour carried on during the madness which had seized Alcmeon, after he had put his mother to death. Virgil transports her into Italy, not for the sake of securing her virginity, but to produce a son of her who built Mantua.

MANTUA, anciently a town of the Transpadana in Italy, situated on the Mincio, a river running from the Lacus Benacus. It is said to have been founded about 300 years before Rome by Bianor or Oenus, the son of Manto; and was the ancient capital of Etruria. When Cremona, which had followed the interest of Brutus, was given to the soldiers of Octavius, Mantua also, which was in the neighbourhood, shared the common calamity, and many of the inhabitants were tyrannically deprived of their possessions. Virgil, who was among them, and a native of the town, applied for redress to Augustus, and obtained it by means of his poetical talents.

It is still called MANTUA, and is the capital of the duchy of that name. It is now a large place, having eight gates and about 16,000 inhabitants. The streets are broad and straight, and the houses well built. It is very strong by situation as well as by art; lying in the middle of a lake, or rather morass, formed by the river Mincio. There is no access to the city but by two causeways which cross this morass, and which are strongly fortified: so that the city is looked upon to

Mantua || Manual.

be one of the most considerable fortresses of Europe; and the allies in 1745, though their army was in the duchy, durst not undertake the siege. It was greatly noted for its silk manufactures, which are now much decayed. The air in the summer time is very unwholesome. The celebrated poet Virgil was born at a village near this city. It was besieged by the French for above six months, in 1796, and surrendered to them on February 2. 1797. On the recommencement of the war, it was attacked by the Austrian and Russian army, to which it surrendered on the 30th of July, 1799, after a short siege. It again fell into the hands of the French after the battle of Marengo, and formed a part of the kingdom of Italy, till it was restored to Austria in 1814 with the rest of Lombardy. E. Long. 10. 46. N. Lat. 45. 8.

MANTUA, the duchy of, a country of Italy, lying along the river Po, which divides it into two parts. It is bounded on the north by the Veronese; on the south by the duchies of Reggio, Modena, and Mirandola; on the east by the Ferrarese; and on the west by the Cremonese. It is about 50 miles in length, and 25 in breadth; is fruitful in corn, pastures, flax, fruits, and excellent wine. Charles IV. the last duke of Mantua, being a vassal of the empire, took part with the French in the dispute relating to the succession of Spain; for which reason he was put under the ban of the empire, and died at Venice in 1708. He having no heirs, the emperor kept the Mantuan in his own hands, and the duke of Savoy had Montserrat; which were confirmed to them by subsequent treaties. After the death of the emperor in 1740, his eldest daughter, the empress queen, kept possession of the Mantuan; and the governor of the Milanese had the administration of affairs. The Mantuan comprehends the duchies of Mantua, Guastalla, and Sabioneta; the principalities of Castiglione, Solforino, and Bosolo; likewise the county of Novellara. The principal rivers are the Po, the Oglio, and the Miucio; and the principal town is Mantua.

MANUAL, a word signifying any thing performed by the hand.

MANUAL (*manualis*) in *Law*, signifies what is employed or used by the hand, and whereof a present profit may be made; as such a thing in the manual occupation of one, is where it is actually used or employed by him.

MANUAL is the name of a service book used in the church of Rome, containing the rites, directions to the priests, and prayers used in the administration of baptism and other sacraments; the form of blessing holy water, and the whole service used in processions.

MANUAL Exercise, in the army, consists in the observance of certain words of command appointed for this purpose. When a regiment is drawn up, or paraded for exercise, the men are placed three deep, either by companies, or divided into platoons, with the grenadiers on the right. When soldiers are drawn up for exercise, the ranks and files should be exactly even; and each soldier should be instructed to carry his arms well, to keep his firelock steady and even upon his shoulder, with the right hand hanging down, and the whole body without constraint. The distances between the files must be equal, and the ranks eight feet distant from each other. Every motion should be performed with life, and the greatest exactness observed in all firings, wheelings, and marching; and therefore a regiment should never be under arms longer than two hours. Manual

The following is an abstract of the words of command at the manual exercise, with their explanations. 1. *Poize your firelock:* i. e. Seize the firelock with your right hand, and turn the lock outwards, keeping the firelock perpendicular; then bring up the firelock with a quick motion from the shoulder, and seize it with the left hand, just above the lock, so that the fingers may lie upon the stock, with the elbows down, and the thumb upon the stock; the firelock must not be held too far from the body, and the left hand must be of an equal height with the eyes. 2. *Cock your firelock:* i. e. Turn the barrel opposite to your face, and place your thumb upon the cock, raising your elbow square at this motion; then cock your firelock, by drawing your elbow down, placing your right thumb on the breech-pin, and the fingers under the guard. 3. *Present:* i. e. Step back about six inches to the rear with the right foot, bringing the left toe to the front; at the same time the butt-end of the firelock must be brought to an equal height with the shoulder, placing the left hand on the swell, and the fore finger of the right hand before the trigger, sinking the muzzle a little. 4. *Fire:* i. e. Pull the trigger briskly, and immediately after, bringing up the right foot to the inside of the left, come to the priming position, with the lock opposite to the right breast, the muzzle to the height of the hat, keeping it firm and steady, and at the same time seize the cock with the fore finger and thumb of the right hand, the back of the hand being turned up. 5. *Half-cock your firelock:* i. e. Half-bend the cock briskly with a draw-back of the right elbow, bringing it close to the butt of the firelock. 6. *Handle your cartridge:* i. e. Bring your right hand with a short round to your pouch, slapping it hard; seize the cartridge, and bring it with a quick motion to your mouth; bite the top well off, and bring the hand as low as the chin, with the elbow down. 7. *Prime:* i. e. Shake the powder into the pan, placing the three last fingers behind the rammer, with the elbow up. 8. *Shut your pan:* i. e. Shut your pan briskly, drawing your right arm at this motion towards your body, holding the cartridge fast in your hand as before; then turn the piece nimbly round to the loading position, with the lock to the front, and the muzzle to the height of the chin, bringing the right hand behind the muzzle, with both feet kept fast in this motion. 9. *Charge with cartridge:* i. e. Turn up your hand, and put the cartridge into the muzzle, shaking the powder into the barrel; place your hand, closed, with a quick and strong motion, upon the rammer. 10. *Draw your rammer:* i. e. Draw the rammer with a quick motion half out, seizing it at the muzzle back-handed; draw it quite out, turn it, and enter it into the muzzle. 11. *Ram down your charge:* i. e. Ram the cartridge well down in the barrel, instantly recovering and seizing the rammer back-handed at the centre, turning it, and entering it as far as the lower pipe, placing at the same time the edge of the hand on the butt end of the rammer, with fingers extended. 12. *Return your rammer:* i. e. Return the rammer, bringing up the piece with the left hand to the shoulder, seizing it with the right hand under

Manual. under the cock, keeping the left hand fast at the swell, turning the body square to the front. 13. *Shoulder your firelock:* i. e. Quit the left hand, and place it strong upon the butt; quit the right hand, and throw it down the right side. 14. *Rest your firelock:* i. e. Seize the firelock with the right hand, turning the lock outwards; raise the firelock from the shoulder, and place your left hand with a quick motion above the lock, holding the piece right up and down in both hands before you, and your left hand even with your eyes; step briskly back with your right foot, placing it a hand's breadth distance from your left heel, and at the same time bring down your firelock as quick as possible to the rest, sinking it as far down before your left hand as your right hand will permit without constraint; your left hand being at the feather spring, and your right, with fingers extended, held under the guard, taking care to draw in the muzzle well towards your body, and to dress in a line with the butt-end. 15. *Order your firelock:* i. e. Place your firelock nimbly with your left hand against your right shoulder; quit the firelock with the right hand, sinking it at the same time with your left; seize it at the muzzle, which must be of an equal height with your chin, and hold it close against your right side; lift up your right foot, and place it by your left; at the same time throw back your left hand by your left side, and with your right bring down the butt-end strong upon the ground, placing it even with the toe of your right foot; the thumb of your right hand lying along the barrel, and the muzzle kept at a little distance from your body. 16. *Ground your firelock:* i. e. Half face to the right upon your heels, and at the same time turn the firelock, so that the lock may point to the rear, and the flat of the butt-end lie against the inside of your foot; at the same time slipping the right foot behind the butt of the firelock, the right toe pointing to the right, and the left to the front: step directly forward with your left foot, about as far as the swell of the firelock, and lay it upon the ground, your left hand hanging down by your left leg, and your right kept fast, with the butt end against it; raise yourself up again nimbly, bringing back your left foot to its former position, keeping your body faced to the right; face again to the left upon your heels, and come to your proper front, letting your hands hang down without motion. 17. *Take up your firelock:* i. e. Face to the right upon both heels; sink your body down, and come to the position described in the second motion of grounding; raise yourself and firelock, bringing it close to your right side; come to your proper front, seizing your firelock at the muzzle, as in explanation 15. 18. *Rest your firelock:* i. e. Bring your right hand as far as the swell; raise the firelock high up in a perpendicular line from the ground with your right hand, and seize it with your left above the spring, the cock being at the height of the waist-belt; step back with your right foot, placing it behind your left heel, and come to the rest. 19. *Shoulder your firelock:* i. e. Lift up your right foot, and place it by your left; bring the firelock at the same time to your left shoulder, and seize the butt-end with the left hand, keeping it in the same position as above described; throw your right hand briskly back. 20. *Secure your firelock:* i. e. Bring the right hand briskly up, and place it under the cock, keeping the firelock steady in the same position; quit Manual. the butt with the left hand, and seize the firelock with it at the swell, bringing the elbow close down upon the lock; the right hand being kept fast in this motion, and the piece still upright; quit the right hand, and bring it down your right side, bringing the firelock nimbly down to the secure; the left hand in a line with the waist-belt. 21. *Shoulder your firelock:* i. e. Bring the firelock up to a perpendicular line, seizing it with the right hand under the cock: quit the left hand, and place it strong upon the butt, quit the right hand, and bring it smartly down the right side. 22. *Fix your bayonet:* i. e. First and second motions, as in the two first of the secure; quit the right hand, and bring the firelock smartly down to the left side with the left hand, as far as it will admit without constraint, seizing the bayonet at the same time with the right hand, and fixing it, placing that hand just below the brass, with the piece kept close to the hollow of the shoulder. 23. *Shoulder your firelock:* i. e. Quit the right hand, and bring up the firelock with the left; seize it again under the cock with your right, as in the second motion of the secure; quit the left hand, and place it strong upon the butt; quit the right hand, and bring it down the right side. 24. *Present your arms:* i. e. as explained in the three motions of the 14th word of command. 25. *To the right face:* i. e. Bring up the firelock with a quick motion high before you, till your left hand comes even with your eyes, both the fingers of that hand extended along the stock, just above the feather-spring, the right foot to be brought close up to the left heel in this motion; face to the right, taking care in facing to hold the firelock right up and down, and steady in your hands; step back with your right foot, and come down to your *present*, as in the foregoing explanation. 26. *To the right face:* i. e. as in the foregoing explanation, facing to the right. 27. *To the right about face:* i. e. as in the 25th explanation, only coming to the right about instead of to the right. 28. *To the left face:* i. e. Bring the right foot briskly to the hollow of your left, with the firelock in the same position as in the first motion of *facing to the right:* face to the left; come down to the *present*, as before. 29. *To the left face:* i. e. as in the foregoing explanation. 30. *To the left about face:* i. e. as before, coming to the left-about instead of to the left. 31. *Shoulder your firelock:* i. e. as in the two motions of the 19th explanation. 32. *Charge your bayonets:* i. e. as in the first explanation: bring the swell of the firelock down strong upon the palm of the hand, grasping the piece at the small, behind the lock, and as high as the waist-belt; the firelock upon a level with the barrel upwards. 33. *Shoulder your firelock:* i. e. Bring up the firelock to the shoulder, place the left hand upon the butt, bringing the feet square to the front; quit the right hand, and throw it down the right side. 34. *Advance your arms:* i. e. first and second motions, as in the first explanation; bring the firelock down the right side, with the right hand as low as it will admit without constraint, slipping up the left hand at the same time to the swell, the guard between the thumb and forefinger of the right hand, the three last fingers under the cock, with the barrel to the rear; quit the left hand. 35. *Shoulder your firelock:* i. e. Bring up the left hand, and seize

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Manual. it at the swell; come smartly up to the poise; shoulder. 36. *Prime and load:* i. e. Come smartly to the *recover*: by springing the firelock straight up with the left hand, turning the barrel inwards to the proper height of the recover: at the same time that the left hand springs the firelock, the right hand is raised briskly from the right side, and seizes the firelock across the breast: as it rises below the cock, the left hand comes with a quick motion from the butt, and seizes the firelock strong above the lock, the little finger of the left hand at the spring of the lock, the left hand at an equal height with the face, the butt close to the body, but not pressed, the firelock perpendicular opposite the left side of the face: bring the firelock down with a brisk motion to the priming position, the left hand holding the firelock, as in priming; the thumb of the right hand placed against the face of the steel, the fingers clenched, and the elbow a little turned out, that the wrist may be clear of the cock: open the pan, by throwing up the steel with a strong motion of the right arm, turning the elbow in, and keeping the firelock steady in the left hand; handle your cartridge, prime, shut your pan, cast about, load, draw rammers, ram down the cartridge, return the rammers, shoulder. *N. B.* The motion of recover, and coming down to the priming position and opening pans, are to be done in the usual time. The motions of handling cartridge to shutting the pans, are to be done as quick as possible: when the pans are shut, a small pause is to be made, and then cast about together; then the loading motions are to be done as quick as possible; but before the rammer is returned, another small pause is to be made, counting 1, 2, between each motion, till the firelock is shouldered.—*Front rank make ready:* i. e. Spring the firelock briskly to the *recover*, keeping the left foot fast in this motion: as soon as the firelock is at the *recover*, without any stop, sink the body briskly without stooping forward, with a quick motion down upon the right knee; the butt-end of the firelock at the same time falls upon the ground, the front part of the butt being in a line with the heel of the left foot. As soon as the butt comes to the ground, the firelock is to be cocked, immediately seizing the cock and steel in the right hand; the firelock to be held firm in the left hand, about the middle of that part of the firelock between the lock and the swell of the stock; the point of the left thumb to be close to the swell, pointing upwards. As the body is sinking, the right knee is to be thrown as far back as the left leg may be right up and down; the right foot to be thrown a little to the right; the body to be kept straight; the head up, looking to the right along the rank, the same as if shouldered; the firelock to be upright, and the butt about four inches to the right of the inside of the left foot. *Present:* i. e. Bring the firelock briskly down to the *present*, by extending the left arm to the full length with a strong motion; at the same time spring up the butt by the cock with the right hand, and raise the butt so high upon the right shoulder, that you may not be obliged to stoop too much with the head; the right cheek to be close to the butt, and the left eye shut, and look along the barrel with the right eye from the breech-pin to the muzzle; keep the left elbow down in an easy position, and stand as steady as possible; the thumb of the right hand to remain in the position as described in the third explanation of the manual. *Fire:* i. e. Pull the trigger as directed in the manual; and as soon as the piece is fired, give yourself a strong spring upon your left leg, raising your body briskly, and straight up, keeping your left foot fast, and bringing the right heel to the inside of the left; at the same time the firelock is to be brought up to the priming position, and half-cocked immediately: a short pause is to be made; then handle cartridge, and go on with the loading motions described in the explanation of *prime and load.*—*Centre rank make ready:* i. e. Spring the firelock briskly to the recover; so soon as the left hand seizes the firelock above the lock, the right elbow is to be nimbly raised a little, placing the thumb of that hand upon the cock; the fingers open by the plate of the lock, and as quick as possible force the piece to the cock, by dropping the elbow, and forcing down the cock with the thumb, stepping at the same time a moderate pace to the right, keeping the left foot fast; as the firelock is cocked, the thumb is to fall below the cock, the right hand seizing the firelock close under the cock firmly, the fore finger not to be before the trigger; the piece to be held in this position perpendicular, opposite the left side of the face, the butt close to the left breast, but not pressed; the body to be straight, and as full to the front as possible: the head kept up, looking to the right of the rank, that the body and the firelock may not stoop forward, nor lean much out of the rank. *Present:* i. e. Spring the firelock from the body to the arm's length with a quick motion, pressing down the muzzle with the left hand, and springing up the butt with the right hand, as in the foregoing explanation of the *front rank*. *Fire:* As in explanation 4, in the manual, with this difference, that the left foot is to be brought up to the right, at the same time that the firelock is brought down to the priming position. The loading motions as in the explanations of priming and loading; and at the last motion of shouldering, to spring to the left again, and cover the file-leaders.—*Rear rank, make ready:* i. e. Recover the firelock, and cock as before directed for the centre rank; as the firelock is recovered and cocked, step briskly straight to the right, with the right foot, a full pace; bring the left heel about six inches before the right foot; the body straight, and as square to the front as possible, as in the explanation of the *centre rank*. *Present:* As in explanation *present*, before. *Fire:* As in explanation of the *centre rank;* and as the firelock is coming down to the priming position, the left is to be brought back to the right; and at the last motion of shouldering, to spring to the left again, and cover the file-leader (A). Manual.

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(A) The manual exercise now described is not precisely the same that it is at present (1807). The difference indeed is not great; but depending partly on the peculiar views of commanding officers, it is so subject to change that it would be useless to detail it in its present form.

Manual || Manumission.

There are some peculiar words of command at the manual exercise of the grenadiers, when apart from the battalion; and also for the cavalry and artillery.

MANUDUCTOR, a name given to an ancient officer in the church; who, from the middle of the choir, where he was placed, gave the signal for the choristers to sing, and marked the measure, beat time, and regulated the music. The Greeks called him *mesachoros*, because seated in the middle of the choir: but in the Latin church he was called *manuductor*; from *manus* and *duco*, "I lead;" because he led and guided the choir by the motions and gesture of the hand.

MANUFACTURE, a commodity produced from raw or natural materials, either by the work of the hand or by machinery.

MANUFACTURER, one who works up a natural product into an artificial commodity.

MANUMISSION, an act whereby a slave or villain is set at liberty, or let out of bondage. The word comes from the Latin *manus*, "hand;" and *mittere*, "to send;" *quia servus mittebatur extra manum seu potestatem domini sui*. Some authors define manumission an act by which a lord enfranchises his tenants, who till that time had been his vassals, and in a state of slavery inconsistent with the sanctity of the Christian faith.

Among the Romans, the manumission of slaves was performed three several ways. 1. When, with his master's consent, a slave had his name entered in the census or public register of the citizens. 2. When the slave was led before the prætor, and that magistrate laid his wand called *vindicta* on his head. 3. When the master gave the slave his freedom by his testament. Servius Tullius is said to have set on foot the first manner; and P. Valerius Publicola the second. A particular account is given of the third in the Institutes of Justinian. It was not necessary that the prætor should be on his tribunal to perform the ceremony of manumission: he did it anywhere indifferently, in his house, in the street, in going to bathe, &c. He laid the rod on the slave's head, pronouncing these words, *Dico eum liberum esse more Quiritum*, "I declare him a freeman, after the manner of the Romans." This done, he gave the rod to the lictor, who struck the slave with it on the head, and afterwards with his hand on his face and back; and the notary or scribe entered the name of the new freedman in the register, with the reasons of his manumission. The slave had likewise his head shaved, and a cap given him by his master as a token of freedom. Tertullian adds, that he had then also a third name given him: if this were so, three names were not a token of nobility, but of freedom. The emperor Constantine ordered the manumissions at Rome to be performed in the churches.

Of manumission there have also been various forms in England. In the time of the Conqueror, villains were manumitted, by the master's delivering them by the right hand to the viscount, in full court, showing them the door, giving them a lance and a sword, and proclaiming them free. Others were manumitted by charter. There was also an implicit manumission: as when the lord made an obligation for payment of money to the bondman at a certain day, or sued him where he might enter without suit, and the like. Manumission || Maouna.

MANURE, any thing used for fattening and improving land. See AGRICULTURE *Index*.

MANUSCRIPT, a book or paper *written with the hand;* by which it stands opposed to a *printed* book or paper. A manuscript is usually denoted by the two letters MS. and in the plural by MSS. What makes public libraries valuable, is the number of ancient manuscripts reposited in them; see ALEXANDRIAN, CAMBRIDGE, CLERMONT, COTTONIAN, HARLEIAN, VATICAN, &c.

MANUTIUS, ALDUS, the first of those celebrated Venetian printers who were as illustrious for their learning as for uncommon skill in their profession. He was born at Bassano in Italy about the middle of the 15th century; and hence is sometimes called *Bassianus*, though generally better known by the name of *Aldus*. He was the first who printed Greek neatly and correctly; and acquired so much reputation by it, that whatever was finely printed was proverbially said to have come from the press of Aldus." We have a kind of Greek grammar of his; with notes upon Homer, Horace, &c. He died at Venice, where he exercised his profession, in 1516.

MANUTIUS, *Paulus*, son of the former, was brought up to his father's profession. He was more learned than he; and he acquired, by continual reading of Tully, such a purity in writing Latin, as even Scaliger allows a Roman could not exceed. Pope Pius IV. placed him at the head of the apostolical press, and gave him the charge of the Vatican library. His Epistles are infinitely laboured, and very correct; but, as may be said of most of the Ciceronians, they contain scarcely any thing but mere words. This constant reading of Tully, however, together with his profound knowledge of antiquity, qualified him extremely well for an editor of Tully; whose works he accordingly published, with Commentaries on them, in 4 vols. folio, at Venice in 1523. He died in 1574.

MANUTIUS, *Aldus*, the Younger, the son of Paulus, and the grandson of Aldus, was esteemed one of the greatest geniuses and most learned men of his time. Clement VIII. gave him the direction of the Vatican printing house: but probably the profits of that place were very small, since Manutius was obliged, for his subsistence, to accept of a professor of rhetoric's chair, and to sell the excellent library that was in his family, which his father, his uncle, and his great uncle, had collected with extraordinary care, and which it is said contained 80,000 volumes. He died at Rome in 1597, without any other recompense than the praises due to his merit. He wrote, 1. Commentaries on Cicero. 2. A Treatise on Orthography. 3. Three books of Epistles; and other works in Latin and Italian, which are esteemed.

MAON, in *Ancient Geography*, a town of the tribe of Judah, to the south east, towards the Dead Sea. It gave name to the *wilderness of Maon*, 1 Sam. xxii.

MAOUNA, one of the Navigator's islands in the south Pacific ocean. Here M. de la Perouse, commander of the French ships the Boussole and Astrolabe, met with his first fatal accident in 1787; M. de

Macuna || Marana

Langle, captain of the Astrolabe, with 11 officers and sailors, were massacred by the natives. W. Long. 169. S. Lat. 14. 19.

MAP, a plane figure, representing the surface of the earth, or a part thereof, according to the laws of perspective. See GEOGRAPHY *Index*.

MAPLE. See ACER, BOTANY *Index*.

MAPLE-Sugar. See SUGAR, CHEMISTRY *Index*.

MAPPA, in the public games of the Roman circus, was a napkin hung out at the prætor's or other great magistrate's seat, as a signal for the race or other diversions to begin. The mappa was received by the mapparius, or person who held it, from the consul, prætor, or other great officer. Notice was anciently given by sound of trumpet; but Nero is said to have introduced the mappa, by throwing his napkin out of the window to satisfy the people, who grew noisy at the delay of the sports while he was at dinner.

MAPPARIUS, in Roman antiquity, the officer who gave the signal to the gladiators to begin fighting.

MARACANDA, in *Ancient Geography*, capital of the Sogdiana. Now thought to be *Samarcand*, a city of Usbec Tartary in Asia, the country and royal residence of Tamerlane. Sse SAMARCAND.

MARACAYBO, a province of South America, surrounding the lake of the same name, bounded on the north by the Caribbean sea, and containing 100,000 inhabitants. See CARACCAS, SUPPLEMENT.

MARACAYBO, a town of South America, capital of a province, and seated near a lake of the same name. It carries on a great trade in skins and chocolate, and they have likewise very fine tobacco. The population is estimated at 8400. It was taken by the French bucaniers in 1666 and 1678. W. Long. 70. 56. N. Lat. 10. 10.

MARACAYBO, a lake in South America, 150 miles long and 90 broad, which communicates with the North sea. It is well defended by strong forts; which, however, did not hinder Sir Henry Morgan, a bucanier, from plundering several towns on the coast. See CARRACCAS, SUPPLEMENT.

MARAGNAN, a province of Brazil in South America, which comprehends a fertile populous island, 112 miles in circumference. The French settled here in 1612, and built a small town; but they were driven from it by the Portuguese, who have possessed it ever since. The climate is pleasant, and the soil fertile. W. Long. 54. 35. S. Lat. 2. 0.

MARALDI, JAMES-PHILIP, a learned mathematician and astronomer, of the Academy of Sciences at Paris, was born in 1665. He was the son of Francis Maraldi and Angela Catharine Cassini, the sister of the famous astronomer of that name. His uncle sent him to France in 1687, where he acquired great reputation on account of his learning and observations. He made a catalogue of the fixed stars, which is more particular and exact than Bayer's; and has given a great number of curious and interesting observations in the memoirs of the academy. He died in 1729.

MARANA, JOHN PAUL, an ingenious writer of the 17th century, was of a distinguished family, and born at Genoa; where he received an education suitable to his birth, and made great progress in the study of polite literature and the sciences. Having been engaged in the conspiracy of Raphael della Terra, to deliver up Genoa to the duke of Savoy, he was in 1670, when 28 years of age, imprisoned in the tower of that city, and remained there four years. Being at length set at liberty, he was ordered to write the history of that conspiracy; but, when finished, it was seized and prevented from being published. When the republic of Genoa was at variance with the court of France, Marana, who had always an inclination for that court, was afraid of being imprisoned a second time; and retired to Monaco, where he again wrote the history of the conspiracy in Italian; and, in 1682, went to Lyons to get it printed. From Lyons he went to Paris, where his merit soon acquired him powerful protectors. He spent the rest of his life in a happy and tranquil mediocrity, devoted to study and the society of men of learning; and died in 1693. His history of the conspiracy contains many curious and interesting anecdotes. He also wrote several other works; the most known of which is the Turkish Spy, in six volumes 12mo, which was in 1742 augmented to seven. Of this ingenious work we have an excellent English translation.

Marana || arathon

MARANO, a town of Friuli in Italy, with a strong citadel; seated in a marsh at the bottom of the gulf of Venice. It contains about 1000 inhabitants.

MARANS, a rich town of France, in the territory of Aunis and diocese of Rochelle, seated among salt marshes, near the river Sevre, three miles from the sea. It carries on a very great trade in corn; and is seated in W. Long. 0. 54. N. Lat. 46. 18.

MARANTA, INDIAN ARROW ROOT, a genus of plants belonging to the monandria class; and in the natural method ranking under the eighth order *Scitamineæ*. See BOTANY *Index*.

MARASMUS, among physicians, denotes an atrophy or consumption in its last and most deplorable stage.

MARATHON, in *Ancient Geography*, one of the demi or hamlets of Attica; about 10 miles to the north-east of Athens, towards Bœotia, near the sea. It still retains its ancient name (Dr Chandler informs us); but is very inconsiderable, consisting only of a few houses and gardens. The plain of Marathon, famous for Miltiades's victory over the Persians, by which the liberties of Athens and other cities of Greece were saved, is long and narrow, but consisting chiefly of level ground, and therefore admitting the operations of cavalry, which formed the main strength of the barbarian army, and with which the Greeks were very poorly provided. Here the Persians, under the command of Datis, pitched their camp, by the advice of Hippias, the banished king of Athens, whose solicitations and intrigues had promoted the expedition, and whose perfect knowledge of the country, and intimate acquaintance with the affairs of Greece, rendered his opinion on all occasions respectable. The Persian army is said to have consisted of 100,000 infantry, and 10,000 horse.—Athens was in the utmost consternation and dismay. She had, upon the

Marathon. first appearance of the Persian fleet, sent to implore assistance from the other nations of Greece: but some had submitted to Darius, and others trembled at the very name of the Medes and Persians. The Lacedæmonians alone promised troops; but various obstacles did not allow them immediately to form a junction with those of Athens. This city therefore could only rely on its own strength; and happily at this moment there appeared three men destined to give new energy to the state. These were Miltiades, Aristides, and Themistocles; whose example and harangues kindled the flame of the noblest heroism in the minds of the Athenians. Levies were immediately made. Each of the ten tribes furnished 1000 foot soldiers with a commander at their head. To complete this number it was necessary to enrol the slaves (A). No sooner were the troops assembled than they marched out of the city into the plain of Marathon, where the inhabitants of Platæa in Bœotia sent them a reinforcement of 1000 infantry.

Scarcely were the two armies in sight of each other, before Miltiades proposed to attack the enemy. Aristides and several of the commanders warmly supported this measure: but the rest, terrified at the excessive disproportion of the armies, were desirous of waiting for the succours from Lacedæmon. Opinions being divided, they had recourse to that of the polemarch, or chief of the militia, who was consulted on such occasions, to put an end to the equality of suffrages. Miltiades addressed himself to him, with the ardour of a man deeply impressed with the importance of present circumstances: "Athens (said he to him) is on the point of experiencing the greatest of vicissitudes. Ready to become the first power of Greece, or the theatre of the tyranny and fury of Hippias, from you alone, Callimachus, she now awaits her destiny. If we suffer the ardour of the troops to cool, they will shamefully bow beneath the Persian yoke; but if we lead them on to battle, the gods and victory will favour us. A word from your mouth must now precipitate your country into slavery or preserve her liberty." Callimachus gave his suffrage, and the battle was resolved. To ensure success, Aristides, and the other generals after his example, yielded to Miltiades the honour of the command which belonged to them in rotation: but, to secure them from every hazard, he preferred waiting for the day which of right placed him at the head of the army.

When that day arrived, Miltiades drew up his troops at the foot of a mountain, on a spot of ground scattered over with trees to impede the Persian cavalry. The Platæans were placed on the left wing; Callimachus commanded the right; Aristides and Themistocles were in the centre of the battle, and Miltiades everywhere. An interval of nearly a mile separated the Grecian army from that of the Persians. At the first signal the Greeks advanced over this space running. The Persians, astonished at a mode of attack so novel to both nations, for a moment remained motionless; but to the impetuous fury of the enemy they soon opposed a more sedate and not less formidable fury. After an obstinate conflict of some hours, victory began to declare herself in the two wings of the Grecian army. The right dispersed the enemy in the plain, while the left drove them back on a morass that had the appearance of a meadow, in which they stuck fast and were lost. Both these bodies of troops now flew to the succour of Aristides and Themistocles, ready to give way before the flower of the Persian troops placed by Datis in the centre of his battle. From this moment the rout became general. The Persians, repulsed on all sides, found their only asylum in the fleet which had approached the shore. The conquerors pursued them with fire and sword, and took, burnt, or sunk the greater part of their vessels: the rest escaped by dint of rowing. Marathon

The Persian army lost about 6400 men: that of the Athenians 192. Miltiades was wounded; Hippias was left dead on the field, as were Stesilcus and Callimachus, two of the Athenian generals. Scarcely was the battle over, when a soldier, worn out with fatigue, forms the project of carrying the first news of so signal a success to the magistrates of Athens, and without quitting his arms, he runs, flies, arrives, announces the victory, and falls dead at their feet.

This battle was fought on the 6th of Boedromion, in the third year of the 72d Olympiad (or 29th September anno 490 B. C.). The next day 2000 Spartans arrived. In three days and nights they had marched 1200 stadia. Though informed of the defeat of the Persians, they continued their march to Marathon, nor did they enviously shun to behold those fields where a rival nation had signalized itself by so heroic an action: they there beheld the tents of the Persians still standing, the plain strewed over with dead, and covered with costly spoils: they there found Aristides, who with his tribe was guarding the prisoners and booty; and did not retire until they had bestowed just applauses on the victors.

The Athenians neglected nothing to eternize the memory of those who fell in the battle. It had been usual to inter the citizens who perished in war at the public expence, in the Ceramicus without the city; but the death of these was deemed uncommonly meritorious. They were buried, and a barrow was made for them, where their bravery had been manifested. Their names were engraven on half columns erected on the plain of Marathon. These monuments, not excepting those of the generals Callimachus and Stesilcus, were in a style of the greatest simplicity. In the intervals between them were erected trophies bearing the arms of the Persians. An artist of eminence had painted all the circumstances of the battle in one of the most frequented porticoes of the city: Miltiades was there represented at the head of the generals, and in the act of exhorting the troops to fight for their country.

Pausanias examined the field of battle about 600 years

(A) *Travels of Anacharsis*; authority, *Pausan.* i. 79. But Dr Gillies seems to think that the armed slaves were not included in the 10,000; but amounted of themselves to a greater number, and which formed the centre of the battle.

Marathon ‖ Maratti.

years after this event. His account of it is as follows: "The barrow of the Athenians is in the plain, and on it are pillars containing the names of the dead under those of the tribes to which they belonged; and there is another for the Platæans and slaves; and a distinct monument of Miltiades the commander, who survived this exploit. There may be perceived nightly the neighing of horses and the clashing of arms. No person has derived any good from waiting on purpose to behold the spectres; but their anger does not fall on any one who happens to see them without design. The Marathonians worship those who were slain in the battle, styling them *heroes*.—A trophy also of white marble has been erected. The Athenians say the Medes were buried, religion requiring that the corpse of a man be covered with earth; though I was not able to find any place of sepulture, for there is no barrow or other sign visible; but they threw them promiscuously into a pit.—Above the lake are the marble mangers of the horses of Artaphernes, with marks of a tent on the rocks."

Many centuries have elapsed since the age of Pausanias; but the principal barrow, it is likely that of the gallant Athenians, still towers above the level of the plain. It is of light fine earth, and has a bush or two growing on it. Dr Chandler informs us, that he enjoyed a pleasant and satisfactory view from the summit; and looked, but in vain, for the pillars on which the names were recorded, lamenting that such memorials should ever be removed. Marathon has since been visited by Dr Clarke, who has given an interesting account of the topography of the field of battle in the 4to vol. of his Travels.

MARATTA. See MARHATTAS.

MARATTI, CARLO, a celebrated painter, was born at Camorano, near Ancona, in 1625. He came a poor boy to Rome, when only 11 years old; and at 12 recommended himself so effectually to Andrea Sacchi, by his drawings after Raphael in the Vatican, that he took him into his school, where he continued 25 years till his master's death. His graceful and beautiful ideas occasioned his being generally employed in painting madonas and female saints. No man ever performed in a better style, or with a greater elegance. From the finest statues and pictures, he made himself master of the most perfect forms, and the most charming airs of heads, which he sketched with equal ease and grace. He has produced a noble variety of draperies, more artfully managed, more richly ornamented, and with greater propriety, than even the best of the moderns. He was inimitable in adorning the heads, in the disposal of the hair, and the elegance of his hands and feet, which are equal to those of Raphael; and he particularly excelled in gracefulness. In his younger days he etched a few prints, as well of his own invention as after others, with equal spirit and correctness. It would be endless to recount the celebrated paintings done by this great man. Yet he executed nothing slightly, often changed his designs, and almost always for the better, whence his pictures were long in hand. By the example of his master, he made several admirable portraits of popes, cardinals, and other people of distinction, from whom he received the highest testimonies of esteem, as he likewise did from almost all the monarchs and princes of Europe. Innocent XI. appointed him keeper of the paintings in his chapel and the Vatican. Maratti erected two noble monuments for Raphael and A. Caracci, at his own expence, in the Pantheon. How well he maintained the dignity of his profession, appears by his answer to a Roman prince, who complaining of the excessive price of his pictures, he told him there was a vast debt due from the world to the famous artists his predecessors, and that he, as their rightful successor, was come to claim those arrears. His abilities in painting were accompanied with many virtues, and particularly with an extensive charity. This great painter died at Rome in 1713, in the 88th year of his age.

Maratti ‖ Marble.

MARAUDING, in a military sense, means a party of soldiers, who, without any order, go into the neighbouring houses and villages, when the army is either in camp or garrison, to plunder and destroy, &c. Marauders are a disgrace to the camp, to the military profession, and deserve no better quarter from their officers than they give to poor peasants, &c.

MARAVEDI, a little Spanish copper coin, worth somewhat more than a French denier, or half a farthing English.

The Spaniards always count by maravedis, both in commerce and in their finances, though the coin itself is no longer current among them. Sixty-three maravedis are equivalent to a rial of silver; so that the piaster, or piece of eight rials, contains 504; and the pistole of four pieces of eight, 2016 maravedis.

This smallness of the coin produces vast numbers in the Spanish accounts and calculations; insomuch that a stranger correspondent would think himself indebted several millions for a commodity that cost but a few pounds.

In the laws of Spain, we meet with several kinds of maravedis; Alphonsine maravedis, white maravedis, maravedis of good money, maravedis Combrenos, black maravedis, and old maravedis. When we find maravedis alone, and without any addition, it is to be understood of those mentioned above. The rest are different in value, fineness of metal, time, &c. Mariana asserts, that this coin is older than the Moors; that it came from the Goths; that it was anciently equal to a third part of the rial, and consequently of 12 times the value of the present maravedi. Under Alphonsus XI. the maravedi was 17 times, under Henry II. ten times, under Henry III. five times, and under John II. two times and a half, the value of the present maravedi.

MARBELLA, a town of Grenada in Spain, situated at the mouth of the Rio Verde, 30 miles north-east of Gibraltar, and 28 south-west of Malaga. W. Long. 4. 59. N. Lat. 36. 31.

MARBLE, a calcareous stone, of which there are many beautiful varieties. The word comes from the French *marbre*, and from the Latin *marmor*, of the Greek μαρμαιρειν, to "shine or glitter." See MINERALOGY *Index*.

Elastic MARBLE, an extraordinary species of fossil which has surprised all the naturalists who have seen it. There are several tables of it preserved in the house of Prince Borghese at Rome, and shown to the curious. F. Jacquier, a celebrated mathematician, has given a description in the Literary Gazette of Paris, but the naturalists cannot be contented with it. If permission was given to make the requisite experiments,

Marble. ments, this curious phenomenon might be better illustrated. There are five or six tables of that marble; their length is about two feet and a half, the breadth about ten inches, and the thickness a little less than three. They were dug up, as the Abbé Fortis was told, in the feod of Mondragone; the grain is of Carrarese marble, or perhaps of the finest Greek. They seem to have suffered some attack of fire; though the first degree of pulverization observable in the angles, can, perhaps, scarcely be called that of imperfect calcination. They are very dry, do not yield to external impression, resound to the hammer, like other congenerous marble, and are perhaps suseeptible of a polish. Being set on end, they bend oscillating backward and forward; when laid horizontally, and raised at one end, they form a curve, beginning towards the middle; if placed on a table, and a piece of wood or any thing else is laid under them, they make a salient curve, and touch the table with both ends. Notwithstanding this flexibility, they are liable to be broken if indiscreetly handled; and therefore one table only, and that not the best, is shown to the curious. Formerly they were altogether in the prince's apartment on the ground floor.

Colouring of MARBLE. This is a nice art; and in order to succeed in it, the pieces of marble on which the experiments are tried, must be well polised, and free from the least spot or vein. The harder the marble is, the better will it bear the heat necessary in the operation; therefore alabaster and the common soft white marble are very improper for performing these operations upon.

Heat is always necessary for opening the pores of marble, so as to render it fit to receive the colours; but the marble must never be made red hot; for then the texture of it is injured, and the colours are burnt, and lose their beauty. Too small a degree of heat is as bad as one too great; for, in this case, though the marble receives the colour, it will not be fixed in it, nor strike deep enough. Some colours will strike even cold; but they are never so well sunk in as when a just degree of heat is used. The proper degree is that which, without making the marble red, will make the liquor boil upon its surface. The menstruums used to strike in the colours must be varied according to the nature of the colour to be used. A lixivium made with horses or dogs urine, with four parts of quicklime and one of potashes, is excellent for some colours; common ley of wood-ashes is very good for others; for some, spirit of wine is best; and lastly, for others, oily liquors, or common white wine.

The colours which have been found to succeed best with the peculiar menstruums, are these: Stone-blue dissolved in six times the quantity of spirit of wine, or of the urinous lixivium, and that colour which the painters call *litmus*, dissolved in common ley of wood-ashes. An extract of saffron, and that colour made of buckthorn berries, and called by painters *sap-green*, both succeed well when dissolved in urine and quicklime; and tolerably well when dissolved in spirit of wine. Vermilion, and a very fine powder of cochineal, also succeed very well in the same liquors. Dragon's blood succeeds in spirit of wine, as does also a tincture of logwood in the same spirit. Alkanet-root gives a fine colour: but the only menstruum to be used for it is oil of turpentine; for neither spirit of wine, nor any lixivium, will do with it. There is another kind of *sanguis draconis*, commonly called *dragon's blood in tears*, which, mixed with urine, gives a very elegant colour. Marble

Besides these mixtures of colours and menstruums, there are other colours which must be laid on dry and unmixed. These are, dragon's blood of the purest kind, for a red; gamboge, for a yellow; green wax, for a green; common brimstone, pitch, and turpentine, for a brown colour. The marble for these experiments must be made considerably hot, and then the colours are to be rubbed on dry in the lump. Some of these colours, when once given, remain immutable, others are easily changed or destroyed. Thus, the red colour given by dragon's blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the polish of the marble not hurt by it.

A fine gold colour is given in the following manner: Take crude sal ammoniac, vitriol, and verdigris, of each equal quantities. White vitriol succeeds best: and all must be thoroughly mixed in fine powder.

The staining of marble to all the degrees of red or yellow, by solutions of dragon's blood or gamboge, may be done by reducing these gums to powder, and grinding them with the spirit of wine in a glass mortar. But, for smaller attempts, no method is so good as the mixing a little of either of those powders with spirit of wine in a silver spoon, and holding it over burning charcoal. By this means a fine tincture will be extracted; and with a pencil dipt in this, the finest traces may be made on the marble while cold; which, on the heating of it afterwards, either on sand, or in a baker's oven, will all sink very deep, and remain perfectly distinct on the stone. It is very easy to make the ground colour of the marble red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whiteness is to remain with some white paint, or even with two or three doubles only of paper; either of which will prevent the colour from penetrating. All the degrees of red are to be given to marble by this gum alone; a slight tincture of it, without the assistance of heat to the marble, gives only a pale flesh colour: but the stronger tinctures give it yet deeper; to this the assistance of heat adds greatly; and finally, the addition of a little pitch to the tincture, gives it a tendency to blackness, or any degree of deep red that may be desired.

A blue colour may be given also to marble by dissolving turnsole in lixivium, in lime and urine, or in the volatile spirit of urine; but this has always a tendency to purple, whether made by the one or the other of these ways. A better blue, and used in an easier manner, is furnished by the Canary turnsole, a substance well known among the dyers. This needs only to be dissolved in water, and drawn on the place with a pencil: it penetrates very deeply into the marble; and the colour may be increased, by drawing the pencil wetted afresh several times over the same lines. This colour is subject to spread and diffuse itself irregularly: but it may be kept in regular bounds, by circumscribing its lines with beds of wax, or any such substance. It is also to be observed, that this

Marble || Marbles.

colour should always he laid on cold, and no heat given even afterwards to the marble; and one great advantage of this colour is, that it is therefore easily added to marbles already stained with other colours, is a very beautiful tinge, and lasts a long time.

MARBLED, something veined or clouded, resembling marble. See MARBLING.

MARBLED China-ware, a name given by many to a species of porcelain or china-ware, which seems to be full of cemented flaws. It is called by the Chinese, who are very fond of it, *tsou tchi*. It is generally plain white, sometimes blue, and has exactly the appearance of a piece of china which had been first broken, and then had all the pieces cemented in their places again, and covered with the original varnish. The manner of preparing it is easy, and might be imitated with us. Instead of the common varnish of the china-ware, which is made of what they call *oil of stone* and *oil of fern* mixed together, they cover this with a simple thing made only of a sort of coarse agates, calcined to a white powder, and separated from the grosser parts by means of water, after long grinding in mortars. When the powder has been thus prepared, it is left moist, or in form of a sort of cream, with the last water that is suffered to remain in it, and this is used as the varnish. Our crystal would serve full as well as those coarse agates, and the method of preparation is perfectly easy. The occasion of the singular appearance of this sort of porcelain is, that the varnish never spreads evenly, but runs into ridges and veins. These often run naturally into a sort of mosaic work, which can scarce be taken for the effect of chance. If the marbled china be desired blue, they first give it a general coat of this colour, by dipping the vessel into a blue varnish; and when this is thoroughly dry, they add another coat of this agate oil.

Artificial MARBLES. The stucco, of which statues, busts, basso-relievos, and other ornaments of architecture are made, ought to be marble pulverized, mixed in a certain proportion with plaster; the whole well sifted, worked up with water, and used like common plaster. See STUCCO.

There is also a kind of artificial marble made of the flaky selenites, or a transparent stone resembling plaster; which becomes very hard, receives a tolerable polish, and may deceive a good eye. This kind of selenite resembles Muscovy talc.

There is another sort of artificial marble formed by corrosive tinctures, which, penetrating into white marble to the depth of a line or more, imitate the various colours of other dearer marbles.

There is also a preparation of brimstone in imitation of marble.

To do this, you must provide yourself with a flat and smooth piece of marble: on this make a border or wall, to encompass either a square or oval table, which may be done either with wax or clay. Then having several sorts of colours, as white lead, vermilion, lake, orpiment, masticot, smalt, Prussian blue, &c.; melt on a slow fire some brimstone in several glazed pipkins; put one particular sort of colour into each, and stir it well together; then having before oiled the marble all over within the wall, with one colour quickly drop spots upon it of larger and less size; after this, take another colour and do as before, and so on till the stone is covered with spots of all the colours you design to use. When this is done, you are next to consider what colour the mass or ground of your table is to be; if of a gray colour, then take fine sifted ashes, and mix it up with melted brimstone; or if red, with English red ochre; if white, with white lead; if black, with lamp or ivory black. Your brimstone for the ground must be pretty hot, that the colour dropt on the stone may unite and incorporate with it. When the ground is poured even all over, you are next, if judged necessary, to put a thin wainscoat board upon it: this must be done while the brimstone is hot, making also the board hot, which ought to be thoroughly dry, in order to cause the brimstone to stick the better to it. When the whole is cold, take it up, and polish it with a cloth and oil, and it will look very beautiful.

Marbles, Marbling.

Arundel MARBLES, marbles, with a chronicle of the city of Athens, inscribed on them (as was supposed) many years before our Saviour's birth; presented to the university of Oxford by Thomas earl of Arundel, whence the name. See *ARUNDELLIAN Marbles*.

Playing MARBLES, are mostly imported from Holland; where it is said they are made by breaking the stone alabaster, or other substance, into pieces or chips, of a suitable size; these are put into an iron mill which turns by water: there are several partitions with rasps within, cut float-wise, not with teeth, which turn constantly round with great swiftness; the friction against the rasps makes them round, and as they are formed, they fall out of different holes, into which size or chance throws them. They are brought from Nuremberg to Rotterdam, down the Rhine, and from thence dispersed over Europe.

MARBLING, the method of preparing and colouring the marbled paper.

There are several kinds of marbled paper; but the principal difference of them lies in the forms in which the colours are laid on the ground: some being disposed in whirls or circumvolutions; some in jagged lengths; and others only in spots of a roundish or oval figure. The general manner of managing each kind is, nevertheless, the same; being the dipping the paper, in a solution of gum-tragacanth, or, as it is commonly called, *gum-dragon;* over which the colours, previously prepared with ox-gall and spirit of wine, are first spread.

The peculiar apparatus necessary for this purpose, is a trough for containing the gum-tragacanth and the colours; a comb for disposing them in the figure usually chosen; and a burnishing stone for polishing the paper. The trough may be of any kind of wood; and must be somewhat larger than the sheets of paper, for marbling which it is to be employed; but the sides of it need only rise about two inches above the bottom; for by making it thus shallow, the less quantity of the solution of the gum will serve to fill it. The comb may be also of wood, and five inches in length; but should have brass teeth, which may be about two inches long, and placed at about a quarter of an inch distance from each other. The burnishing stone may be of jasper or agate; but as those stones are very dear when of sufficient largeness, marble or glass may be used, provided their surface be polished to a greater degree of smoothness.

These

Marbling. These implements being prepared, the solution of gum-tragacanth must be made, by putting a sufficient proportion of the gum, which should be white and clear from all foulness, into clean water, and letting it remain there a day or two, frequently breaking the lumps, and stirring it till the whole shall appear dissolved and equally mixed with the water. The consistence of the solution should be nearly that of strong gum-water used in miniature painting; and if it appear thicker, water must be added; or if thinner, more of the gum. When the solution is thus brought to a due state, it must be passed through a linen cloth; and being then put into the trough, it will be ready to receive the colours.

The colours employed for red are carmine, lake, rose-pink, and vermilion; but the two last are too hard and glaring, unless they be mixed with rose-pink or lake, to bring them to a softer cast; and with respect to the carmine and lake, they are too dear for common purposes. For yellow, Dutch pink and yellow ochre may be employed:—for blue, Prussian blue and verditer may be used:—for green, verdigris, a mixture of Dutch pink and Prussian blue or verditer, in different proportions:—for orange, the orange lake, or a mixture of vermilion, or red lead, with Dutch pink:—for purple, rose pink and Prussian blue.

These several colours should be ground with spirit of wine till they be of a proper fineness; and then, at the time of using them, a little fish-gall, or in default of it the gall of a beast, should be added, by grinding them over again with it. The proper proportion of the gall must be found by trying them: for there must be just so much as will suffer the spots of colour, when sprinkled on the solution of the gum-tragacanth, to join together, without intermixing or running into each other.

When every thing is thus prepared, the solution of the gum-tragacanth must be poured into the trough; and the colours, being in a separate pot, with a pencil appropriated to each, must be sprinkled on the surface of the solution, by shaking the pencil, charged with its proper colour, over it; and this must be done with the several kinds of colour desired, till the surface be wholly covered.

When the marbling is proposed to be in spots of a simple form, nothing more is necessary; but where the whirls or snail-shell figures are wanted, they must be made by means of a quill; which must be put among the spots to turn them about, till the effect be produced. The jagged lengths must be made by means of the comb above described, which must be passed through the colours from one end of the trough to the other; and will give them that appearance: but if they be desired to be pointed both ways, the comb must be again passed through the trough in a contrary direction; or if some of the whirls or snail-shell figures be required to be added, they may be yet made by the means before directed.

The paper should be previously prepared for receiving the colours, by dipping it over-night in water; and laying the sheets on each other with a weight over them. The whole being thus ready, the paper must be held by two corners, and laid in the most gentle and even manner on the solution covered with the colours; and there softly pressed with the hand, that it may bear everywhere on the solution. After which it must be raised and taken off with the same care, and then hung to dry across a proper cord, suspended near at hand for that purpose; and in that state it must continue till it be perfectly dry. It then remains only to give the paper a proper polish: in order to which, it is first rubbed with a little soap; and then must be thoroughly smoothed by the glass polishers, such as are used for linen, and called the *calendar glasses*. After which it should be again rubbed by a burnisher of jasper or agate; or, in default of them, of glass ground to the highest polish; for on the perfect polish of the paper depends in a great measure its beauty and value. Marbling || Marcellus.

Gold or silver powders may be used, where desired, along with the colour; and require only the same treatment as them, except that they must be first tempered with gum-water.

Marbling of books or paper is performed thus: Dissolve four ounces of gum arabic into two quarts of fair water; then provide several colours mixed with water in pots or shells; and, with pencils peculiar to each colour, sprinkle them by way of intermixture upon the gum-water, which must be put into a trough or some broad vessel; then with a stick curl them, or draw them out in streaks, to as much variety as may be done. Having done this, hold your book or books close together, and only dip the edges in, on the top of the water and colours, very lightly; which done, take them off, and the plain impression of the colours in mixture will be upon the leaves; doing as well the ends as the front of the book in the like manner.

Marbling a book on the covers is performed by forming clouds with aquafortis or spirit of vitriol mixed with ink, and afterwards glazing the covers. See Book Binding.

MARC Antonio. See Raimondi.

MARCASITE, an old term in mineralogy, given indifferently to ores, pyrites, and to semimetals. But more lately confined to pyrites, and to such pyrites as are regularly formed. See Pyrites, Mineralogy *Index*.

MARCELLIANISM, the doctrines and opinions of the Marcellians, a sect of ancient heretics, towards the close of the second century, so called from Marcellus of Ancyra, their leader, who was accused of reviving the errors of Sabellius. Some, however, are of opinion that Marcellus was orthodox, and that they were his enemies the Arians, who fathered their errors upon him. St Epiphanius observes, that there was a great deal of dispute with regard to the real tenets of Marcellus; but that, as to his followers, it is evident they did not own the three hypostases: for Marcellus considered the Son and Holy Ghost as two emanations from the divine nature, which, after performing their respective offices, were to return again into the substance of the Father; and this opinion is altogether incompatible with the belief of three distinct persons in the Godhead.

MARCELLINUS, Ammianus. See Ammianus.

MARCELLUS, Marcus Claudius, a famous Roman general, who, after the first Punic war, had the management of an expedition against the Gauls. Here he

Marcellus || March.

he obtained the *spolia opima*, by killing with his own hand Viridomarus the king of the enemy. Such success rendered him popular, and soon after he was intrusted to oppose Hannibal in Italy. He was the first Roman who obtained some advantage over this celebrated Carthaginian, and showed his countrymen that Hannibal was not invincible. The troubles which were raised in Sicily by the Carthaginians at the death of Hieronymus, alarmed the Romans; and Marcellus, in his third consulship, was sent with a powerful force against Syracuse. He attacked it by sea and land; but his operations proved long ineffectual, and the invention and industry of Archimedes were able to baffle all the efforts, and to destroy all the great and stupendous machines and military engines of the Romans, during three successive years. The perseverance of Marcellus at last obtained the victory. After this conquest, Marcellus was called upon by his country a second time to oppose Hannibal. In this campaign he behaved with greater vigour than before; the greatest part of the towns of the Samnites, which had revolted, were recovered by force of arms, and 3000 of the soldiers of Hannibal made prisoners. Some time after, in an engagement with the Carthaginian general, Marcellus had the disadvantage: but on the morrow a more successful skirmish vindicated his military character and the honour of the Roman soldiers. Marcellus, however, was not sufficiently vigilant against the snares of his adversary. He imprudently separated himself from his camp, and was killed in an ambuscade in the 60th year of his age, in his 5th consulship, A. U. C. 544. His body was honoured by the conqueror with a magnificent funeral, and his ashes were conveyed in a silver urn to his son. Marcellus claims our commendation for his private as well as public virtues; and the humanity of a general will ever be remembered, who, at the surrender of Syracuse, wept on the thought that many were going to be exposed to the avarice and rapaciousness of an incensed soldiery, which the policy of Rome and the laws of war rendered inevitable.

MARCGRAVE, or MARGRAVE, a kind of dignity in Germany, answering to our marquis; (see MARQUIS). The word is derived from the German *Marche*, or *Marcke*, which signifies "a frontier;" and *Graffe*, "count, governor;" *Marcgraves* being originally governors of cities lying on the frontiers of a country or state.

MARCH, (*Martius*), the third month of the year, according to the common way of computing. See MONTH and YEAR.

Among the Romans, March was the first month; and in some ecclesiastical computations, that order is still preserved; as particularly reckoning the number of years from the incarnation of our Saviour; that is, from the 25th of March.

It was Romulus who divided the year into months; to the first of which he gave the name of his supposed father *Mars*. Ovid, however, observes, that the people of Italy had the month of March before Romulus's time; but that they placed it very differently, some making it the third, some the fourth, some the fifth, and others the tenth month of the year.

In this month it was that the Romans sacrificed to Anna Perenna; that they began their comitia; that they adjudged the public farms and leases; that the mistresses served the slaves and servants at table, as the masters did in the Saturnalia; and that the vestals renewed the sacred fire. March.

The month of March was always under the protection of Minerva, and always consisted of 31 days.—The ancients held it an unhappy month for marriage, as well as the month of May.

MARCH, in the military art, is the moving of a body of men from one place to another. Nothing is laid down particularly concerning the marches of the Jewish armies; only this much we may collect, that they made use of trumpets, to the different sounds of which they prepared themselves by packing up their baggage, putting themselves in readiness, and attending at the standards, to wait the signal for marching. We are told that the army of the Israelites marched in general no more than one league in a day and a half; but this appears to hold good only of their progress through difficult roads: For Follard says they might, in an open country, march four leagues in a day or more. The Rabbins suppose that the Israelites marched in the same order they were placed in their camp. The Greeks, let the posture of their affairs be what it would, never marched against their enemies till favourable omens encouraged the enterprise. An eclipse of the moon, or any untoward accident, or the intervening of what they esteemed an unlucky day, entirely prevented their march. But of all the Greeks the Lacedæmonians were the most nice and scrupulous. The heavenly bodies directed all their motions; and it was an invariable maxim with them never to march before the full moon. The Greeks are particularly remarked by Homer for marching in good order and profound silence; whereas the Barbarian forces were all noise, clamour, and confusion. It is needless to say any thing concerning the marches of the Roman armies, more than that they were performed with the greatest order and despatch, insomuch that their unexpected presence frequently damped the spirits of their enemies. The Roman soldiers were inured to the military pace, that is, to walk 20 miles in five hours, though at the same time they carried burdens of 60 pounds weight.

Of all the mechanical parts of war, in modern times, none is more essential than that of marching. It may be justly called the *key* which leads to all sublime motions and manœuvres of an army; for they depend entirely on this point. A man can be attacked in four different ways; in the front, on both flanks, and in the rear: but he can defend himself, and annoy the enemy, only when placed with his face towards him. Hence it follows, that the general object of marching is reduced to three points only; to march forwards, and on both sides, because it is impossible to do it for any time backwards, and by that means face the enemy wherever he presents himself.—The different steps to be made use of are three: slow, fast, and oblique. The first is proper in advancing, when at a considerable distance from the enemy, and when the ground is unequal, that the line may not be broke, and a regular fire kept up without intermission. The second is chiefly necessary when you want to anticipate the enemy in occupying some post, in passing a defile, and, above all, in attacking an intrenchment,

to

March, Marchand.

to avoid being a long while exposed to the fire of the artillery and small arms, &c. The third step is of infinite consequence, both in the infantry and cavalry; columns may be opened and formed into lines, and *vice versa*, lines into columns, by this kind of step, in a lesser space, and consequently in less time, than by any other method whatsoever. In coming out of a defile, you may instantly form the line without presenting the flank to the enemy. The line may be formed, though ever so near to the enemy, with safety; because you face him, and can with ease and safety protect and cover the motion of the troops, while they are coming out of the defiles, and forming. The same thing may be equally executed, when a column is to be formed in order to advance or retreat; which is a point of infinite consequence, and should be established as an axiom.

The order of march of the troops must be so disposed, that each should arrive at their rendezvous, if possible, on the same day. The quarter-master-general or his deputy, with an able engineer, should sufficiently reconnoitre the country, to obtain a perfect knowledge of it and the enemy, before he forms his routes.

Before a march, the army generally receives several days bread. The quarter-masters, camp-colour-men, and pioneers, parade according to orders, and march immediately after, commanded by the quarter-master-general or his deputy. They are to clear the roads, level the ways, make preparation for the march of the army, &c. The *general*, for instance, beats at two, the *assembly* at three, and the army to march in 20 minutes after. Upon beating the *general*, the village, and general officer's guards, quarter and rear guards, join their respective corps; and the army pack up their baggage. Upon beating the *assembly*, the tents are to be struck, and sent with the baggage to the place appointed, &c.

The companies draw up in their several streets, and the rolls are called. At the time appointed, the drummers are to beat a march, and fifers play at the head of the line, upon which the companies march out from their several streets, form battalions, as they advance to the head of the line, and then halt.

The several battalions will be formed into columns by the adjutant-general, and the order of march, &c. be given to the general officers who lead the columns.

The cavalry generally march by regiments or squadrons. The heavy artillery always keeps the great roads in the centre of the columns, escorted by a strong party of infantry and cavalry. The field pieces march with the columns.

Each soldier generally marches with 36 rounds of powder and ball, and two good flints; one of which is to be fixed in the cock of his firelock. The routes must be formed so that no columns cross one another on the march.

MARCHAND, Professor, was from his youth brought up at Paris in the profession of a bookseller, and in the knowledge of books. He kept a regular correspondence with several learned men, among whom was Bernard the continuator of the *Nouvelles de la Republique des Lettres*, and furnished this writer with the literary anecdotes of France. Marchand, having embraced the Protestant religion, went to join Bernard in Holland, where he might be at liberty to profess his religious opinions. He continued the trade of bookseller for some time; but afterwards quitted it, that he might dedicate himself wholly to the pursuits of literature. The history of France, together with a knowledge of books and authors, was always his favourite study. In the latter he was so eminently distinguished, that he was consulted from all parts of Europe. He was also one of the principal authors of the *Journal Litteraire*, one of the best periodical works which have appeared in Holland; and he furnished excellent extracts for the other journals. This valuable and learned man died at an advanced age, the 14th of June 1756; and left the little fortune which he had to a society instituted at the Hague, for the education and instruction of a certain number of poor people. His library, which was excellently chosen for literary history, together with his manuscripts, was left by his will to the university of Leyden. From him we have, 1. The History of Printing, a new edition of which has been promised by one of his friends. This work, which is full of notes and critical discussions, appeared in 1740 at the Hague, in 4to. There is such a prodigious display of erudition, and remarks and quotations are heaped together in such confusion, that when you get to the end of the chaos, you know not what conclusion to form concerning the points which have been discussed. Abbé Mercier, abbot of Saint Leger de Soissons, gave in 1775, 4to, a supplement to this history, which is equally curious and accurate. 2. An Historical Dictionary, or Memoirs Critical and Literary, printed at the Hague in 1758, in two small volumes, folio. In this work we meet with historical singularities, literary anecdotes, and a discussion of points of bibliography; but too great minuteness prevails in it, the style is deficient in point of purity, and the author is too much carried away by the heat and eagerness of his character. More erudition could not well be collected; especially upon subjects which, at least to the generality of readers, are so uninteresting. 3. A new edition of Bayle's Dictionary, and Letters of the *Cymbalum mundi*, &c.

Marchand || Marches.

MARCHANTIA, a genus of the natural order of algæ, belonging to the cryptogamia class of plants. See Botany *Index*.

MARCHE, before the revolution, a province of France, bounded on the north by Berry, on the east by Auvergne, on the west by Angoumois, and on the south by Limosin; about 55 miles in length, and 25 in breadth, and fertile in corn and wine.

MARCHENA, a handsome, ancient, and considerable town of Spain, in Andalusia, with the title of a duchy, and a suburb as large as the town, seated in the middle of a plain, particularly fertile in olives, though very destitute of water. W. Long. 5. 20. N. Lat. 37. 20.

MARCHERS, or Lords-Marchers, were those noblemen that lived on the marches of Wales or Scotland; who, in times past, according to Camden, had their laws, and *potestatem vitæ*, &c. like petty kings, which are abolished by the stat. 27 Hen. VIII. c. 26. and 1 Edw. VI. c. 10. In old records the lords marchers of Wales were styled *Marchianes de Marchia Walliæ*. See 1 et 2 P. et M. c. 15.

MARCHES (*marchia*), from the German *march*, i. e.

Marches || Marcianus.

i. e. *limes*, or from the French *marque*, viz. *signum* (being the notorious distinction between two countries or territories), are the limits between England and Wales, or between England and Scotland, which last are divided into west and middle marches, 4 Hen. V. c. 7. 22 Ed. IV. c. 8. 24 Hen. VIII. c. 9. And there was formerly a court called the *court of the marches of Wales*, where pleas of debt or damages, not above the value of 50 pounds, were tried and determined; and if the council of the marches held plea for debts above that sum, &c. a prohibition might be awarded. Hill. 14 Car. I. Cro. Car. 38.

MARCHET, or MARCHETTA, a pecuniary fine anciently paid by the tenant to his lord, for the marriage of one of the tenant's daughters. This custom obtained, with some difference, throughout all England and Wales, as also in Scotland; and it still continues to obtain in some places. According to the custom of the manor of Dinover in Caermarthenshire, every tenant at the marriage of his daughter pays ten shillings to the lord; which, in the British language, is called *gwabr-merched*, i. e. *maid's fee*.

In Scotland, and the north parts of England, the custom was, for the lord to lie the first night with the bride of his tenant; but this usage was abrogated by King Malcolm III. at the instance of his queen; and, instead thereof, a mark was paid by the bridegroom to the lord: whence it was called *merchetta mulieris*. See *BOROUGH English*.

MARCIANA SILVA, in *Ancient Geography*, a forest situated between the Rauraci and the Danube, before it comes to be navigable; a part of the Hercynia. Now Schwartzwald, or *Black Forest*, in the south-west of Suabia, near the rise of the Danube and Neckar.

MARCIANUS, a native of Thrace, born of an obscure family. After he had for some time served in the army as a common soldier, he was made private secretary to one of the officers of Theodosius. His winning address and uncommon talents raised him to higher stations; and on the death of Theodosius II. A. D. 450, he was invested with the imperial purple in the east. The subjects of the Roman empire had reason to be satisfied with their choice. Marcianus showed himself active and resolute; and when Attila, the barbarous king of the Huns, asked of the emperor the annual tribute, which the indolence and cowardice of his predecessors had regularly paid, the successor of Theodosius firmly said, that he kept his gold for his friends, but that iron was the metal which he had prepared for his enemies. In the midst of universal popularity, Marcianus died, after a reign of six years, in the 69th year of his age, as he was making warlike preparations against the barbarians that had invaded Africa. His death was long lamented; and indeed his merit was great, since his reign has been distinguished by the appellation of the Golden Age. Marcianus married Pulcheria the sister of his predecessor. It is said, that in the years of his obscurity he found a man who had been murdered, and that he had the humanity to give him a private burial; for which circumstance he was accused of the homicide, and imprisoned. He was condemned to lose his life; and the sentence would have been executed, had not the real murderer been discovered, and convinced the world of the innocence of Marcianus.——Another emperor of the east, A. D. 479, &c. Marcianus || Marcomanni.

MARCIONITES, or MARCIONISTS, *Marcionistæ*, a very ancient and popular sect of heretics, who, in the time of St Epiphanius, were spread over Italy, Egypt, Palestine, Syria, Arabia, Persia, and other countries: they were thus denominated from their author Marcion. Marcion was of Pontus, the son of a bishop, and at first made profession of the monastical life; but he was excommunicated by his own father, who would never admit him again into the communion of the church, not even on his repentance. On this he abandoned his own country, and retired to Rome, where he began to broach his doctrines.

He laid down two principles, the one good, the other evil: between these he imagined an intermediate kind of deity of a mixed nature, who was the creator of this inferior world, and the god and legislator of the Jewish nation: the other nations, who worshipped a variety of gods, were supposed to be under the empire of the evil principle. These two conflicting powers exercise oppressions upon rational and immortal souls; and therefore the supreme God, to deliver them from bondage, sent to the Jews a being more like unto himself, even his son Jesus Christ, clothed with a certain shadowy resemblance of a body; this celestial messenger was attacked by the prince of darkness, and by the god of the Jews, but without effect. Those who follow the directions of this celestial conductor, mortify the body by fastings and austerities, and renounce the precepts of the god of the Jews and of the prince of darkness, shall after death ascend to the mansions of felicity and perfection. The rule of manners which Marcion prescribed to his followers was excessively austere, containing an express prohibition of wedlock, wine, flesh, and all the external comforts of life.

Marcion denied the real birth, incarnation, and passion of Jesus Christ, and held them to be all apparent only. He denied the resurrection of the body; and allowed none to be baptized but those who preserved their continence; but these, he granted, might be baptized three times. In many things he followed the sentiments of the heretic Cerdon, and rejected the law and the prophets. He pretended the gospel had been corrupted by false prophets, and allowed none of the evangelists but St Luke, whom also he altered in many places, as well as the epistles of St Paul, a great many things in which he threw out. In his own copy of St Luke he threw out the two first chapters entire.

MARCITES, MARCITÆ, a sect of heretics in the second century, who also called themselves the *perfecti*, and made profession of doing every thing with a great deal of liberty and without any fear. This doctrine they borrowed from Simon Magus, who however was not their chief; for they were called *Marcites* from one Marcus, who conferred the priesthood, and the administration of the sacraments, on women.

MARCO POLO, PAOLO, or *Paulo*. See PAULO.

MARCOMANNI, an ancient people of Germany, who seem to have taken their name from their situation on the limits or marches, to the east of the Higher Rhine, and the north of the Danube. Cluverius allots to them the duchy of Wurtemburg, a part of the

Marcomanni || Marets.

the palatinate between the Rhine and the Necker, the Brisgau, and a part of Suabia, lying between the springs of the Danube and the river Bregentz: they afterwards removed to the country of the Boii, whom they expelled and forced to withdraw more to the east, occupying what is now called *Bohemia*. (Strabo, Velleius).

MARCOSIANS, or COLOBARSIANS, an ancient sect in the church, making a branch of the VALENTINIANS.

St Irenæus speaks at large of the leader of this sect, Marcus, who it seems was reputed a great magician. The Marcosians had many apocryphal books which they held for canonical, and out of which they picked several idle fables touching the infancy of Jesus Christ. Many of these fables are still in use and credit among the Greek monks.

MARCULUS, among the Romans, a knocker or instrument of iron to knock at doors with.

MARCUS AURELIUS ANTONINUS. See ANTONINUS.

MARDIKERS, or TOPASSES, a mixed breed of Dutch, Portuguese, Indians, and other nations, incorporated with the Dutch at Batavia, in the East Indies.

MARE, the female of the horse kind. See EQUUS, MAMMALIA *Index*, and HORSE.

MARENGO, a village of Italy which has risen to distinction in consequence of a bloody battle between the Austrians and French, which was fought on the 14th June 1800, in which the French say, 15,000 of the former were killed, wounded, and made prisoners.—Marengo lies 3 miles S. E. of Alessandria, in the kingdom of Sardinia.

MAREOTIS, a lake in Egypt near Alexandria. Its neighbourhood was famous for wine; though according to some the *Marcoticum vinum* is the produce of Epirus, or of a certain part of Libya, called also *Mareotis*, near Egypt.

MARETS, JEAN DE, a Parisian, one of the finest geniuses of the 17th century, became at last a visionary and a fanatic. He was a great favourite of Cardinal Richelieu, who was greatly delighted with his facetious conversation. He was a member of the French academy from its first erection. He wrote several dramatic pieces, which were well received. He attempted an epic poem; but after spending several years about it, dropped the design to write books of devotion. He likewise wrote romances, which are not very rigid for their morality. He was a declared enemy of the Jansenists. His visions are well described by the Messieurs de Port Royal. He promised the king of France, by the explication of prophecies, the honour of overthrowing the Mahometan empire, and every species of what he was pleased to denominate heresy, bringing the whole world to the profession of the true faith. This he said Louis XIV. was to accomplish at the head of 144,000 elect. Extravagant and absurd as these declarations were, he was, notwithstanding, admired and patronised by some of the bishops; and though a layman, he was permitted to vent his reveries in religious houses, and assume the direction of devotees of both sexes. He maintained his credit with the great to the very last, and died in 1676, at the age of 81. In his last years he wrote something against Boileau's Satires.

MARETS, *Samuel de*, one of the most celebrated divines of the reformed church, was born in Picardy, in 1599. In 1620, he was settled in the church of Laon; but, in 1624, accepted a call to that of Sedan, to succeed James Cappel in the office of pastor and professor of divinity. Having soon after obtained leave of absence from his flock, he visited Holland, where he was admitted to the degree of doctor of divinity at Leyden, in 1625. From Holland he took a voyage to England, and after a short stay in that country he returned to Sedan, where he commenced his labours in the divinity chair. These he continued for about seven years with reputation to himself, but not without being sometimes involved in troubles, which he bore with a commendable resolution.

Marets. Margaret.

In 1631 he was made chaplain to the army of the duke de Bouillon in Holland; but that nobleman having married a Roman Catholic lady, M. de Marets, advised him to adhere steadily to the Protestant faith, on which account he incurred the displeasure of the duchess. Thus circumstanced, he received in 1636, an invitation to become pastor to the church of Boisleduc, with which he complied, and in the following year he was appointed professor of the *schola illustris* of the same city. The duties of this office he discharged with such diligence and success, that in 1640, the curators of the university of Franeker sent him the offer of a professorship, which he declined; but two years after he accepted a similar offer from the university of Groningen, to which his services were devoted for upwards of thirty years. In 1652 he was made sole minister of the Walloon church at Groningen, where till that time he had gratuitously preached once every Sunday to assist the pastor. Influenced by the fame of his extraordinary merits, the magistrates of Berne in 1661 offered him the chair of professor of divinity at Lausanne, with considerable emoluments, but he declined this offer; and his death happened before he took possession of a similar charge at Leyden, of which he had accepted. His System of Divinity was found to be so methodical, that it was made use of at other academies; and at the end of it may be found a chronological table of all his works. Their number is prodigious; and their variety shows the extent of his genius. He was moreover engaged in many disputes and controversies, and died in 1673.

MARGARET, ST, a celebrated virgin, who, as is supposed, received the crown of martyrdom at Antioch in the year 275: the manner of her death is not known. The ancient martyrologists make no mention of her name, and she did not become famous till the 11th century. There is no more foundation for what is said concerning her relics and girdles than for the stories which are told of her life. A festival, however, is still held in honour of her memory on the 20th of July: See *Baillet's Lives of the Saints*, for that day. "Her actions (says this authority) have been so falsified and altered, in the opinion even of Metaphrastus, that the Romish church have not thought proper to insert any of them into their breviary." The Orientals pay reverence to her by the name of *Saint Pelagia* or *Saint Marina*, and the western church by that of *Saint Geruma* or *Saint Margaret*.

MARGARET, the daughter and heiress of Florent count of Holland, who is famous on account of a story repeated by a hundred compilers even of the 18th century. Having refused charity to a woman whom she at the same time accused of adultery, she was, as

Margaret. a punishment from God, brought to bed (A. D. 1276), of 365 children, partly boys and partly girls. The boys, it is added, were all named *John*, and the girls *Elizabeth*. This story is represented in a large painting in a village not far from the Hague; and by the side of the painting are seen two large basons of brass, on which it is pretended the 365 children were presented to be baptized. But if a picture is a sufficient authority for the truth of any thing, it is impossible to tell how many fables would be fully attested. It has been remarked, that the most ancient annals are altogether silent concerning this fact; and that it is related only by modern writers, who besides do not agree with one another concerning either the date of time, or the life of the countess, or the number of the children; and, in short, that Nassau, who was at that time bishop of Utrecht, was called *John*, and not *Gui*, as the chronicles declare. Several learned men have endeavoured to trace the cause which could have given rise to a relation so extraordinary. M. Struik fixed upon the epitaphs of the mother and son, which appeared to him worthy of some attention; and, in conformity to the dates which they bear, he supposed that the countess was brought to bed on Good Friday 1276, which was the 26th of March. Now, as the year then began on the 25th of the same month, there were only two days of the year elapsed when the countess was brought to bed, which circumstance caused it to be said *that she had brought into the world as many children as there were days in the year*. In fact only two children are mentioned in history, John and Elizabeth. The fable thus explained is only a common event, wherein there is nothing of the marvellous, but in consequence of a double meaning in the expression. Later writers, who have not examined this circumstance, have ascribed 365 children to the countess. *Journal des Sçavans*, February, 1758, on the General History of the United Provinces.

MARGARET, *Countess of Richmond and Derby*, the learned and pious mother of Henry VII. was born at Betshoe in Bedfordshire, in 1441; and was the sole heiress of John Beaufort duke of Somerset, grandson to John of Gaunt. Her mother was the heiress of Lord Beauchamp of Powick. Whilst yet very young, the great duke of Suffolk, minister to Henry VI. or rather to Queen Margaret, sought her in marriage to his son; and she was at the same time solicited by the king for his half brother Edmund earl of Richmond. To the latter she gave her hand. Henry VII. was the sole fruit of this marriage, his father dying when he was but 15 weeks old. Her second husband was Sir Henry Stafford, knight, second son to the duke of Buckingham; by whom she had no issue. Soon after his death, which happened in the year 1482, she sought consolation in a third husband, Thomas Lord Stanley, who, in the first year of her son's reign, was created earl of Derby. He died in the year 1504, without issue, being then high constable of England. She survived her lord not quite five years, dying at Westminster in June 1509, in the 69th year of her age. She was buried in Henry VII.'s chapel; on the south side of which was erected to her memory an altar-tomb of black marble, with her statue of brass.

From her funeral sermon preached by her confessor Bishop Fisher, who, says Ballard, knew the very secrets of her soul, we learn, "that she possessed almost all things that were commendable in a woman, either in mind or body." She understood the French language perfectly, and had some knowledge of the Latin. She was devout even to austerity, in humility romantic, profuse in the encouragement of learning, and singularly chaste; but this last virtue became conspicuous only towards the latter end of a third marriage. "In her last husband's days (says Baker), she obtained a licence of him to live chaste, whereupon she took upon her the vow of celibacy." "A boon (says Mr Walpole), as seldom requested, I believe of a third husband, as it probably would be easily granted." Her life, from the turbulence of the times, and vicissitudes of her son's fortune, must necessarily have been subject to infinite disquiet, which however she is said to have supported with singular fortitude. She wrote, 1. The Mirroure of Golde for the sinful soul, translated from a French translation of a book called *Speculum aureum peccatorum*. Emprynted at London, in Flete-strete, at the signe of St George, by Richard Pynson, quarto, with cuts on vellum. 2. Translation of the fourth book of Dr Gersen's Treatise of the Imitation and following the blessed Life of our most merciful Saviour Christ. Printed at the end of Dr William Atkinson's English translation of the three first books, 1504. 3. A letter to the king: in Howard's collection. 4. By her son's order and authority, she also made the orders for great estates of ladies and noble women, for their precedence, and wearing of barbes at funerals, over the chin and under the same. Margaret, Margarita.

MARGARET, the daughter of Woldemar III. king of Denmark, styled the *Semiramis of the North*; she succeeded her father in the throne of Denmark, her husband in that of Norway; and the crown of Sweden was given her as a recompense for delivering the Swedes from the tyranny of Albert their king. Thus possessed of the three kingdoms, she formed the grand political design of a perpetual union, which she accomplished, *pro tempore* only, by the famous treaty styled the *union of Calmar*. She died in 1412, aged 59.

MARGARET of Anjou, daughter of René d'Anjou, king of Naples, and wife of Henry VI. king of England: an ambitious, enterprising, courageous woman. Intrepid in the field, she signalized herself by heading her troops in several battles against the house of York; and if she had not been the authoress of her husband's misfortunes, by putting to death the duke of Gloucester his uncle, her name would have been immortalized for the fortitude, activity, and policy, with which she supported the rights of her husband and son, till the fatal defeat at Tewksbury; which put an end to all her enterprises, the king being taken prisoner, and Prince Edward their only son basely murdered by Richard duke of York. Margaret was ransomed by her father, and died in Anjou in 1482. See ENGLAND, N° 201—226.

MARGARET, *Duchess of Newcastle*. See CAVENDISH.

MARGARITA, or PEARL-ISLAND, an island of South America, the middle of which is situated in W. Long.

Margarita || Marhattas.

Long. 64. 2. N. Lat. 11. 30. It was discovered by Columbus, and is about 35 leagues in compass. The soil is very fertile in maize and fruits, and abounds in pasture and verdant groves; yet is totally destitute of fresh water, which the inhabitants are obliged to bring from the continent. When the Spaniards first landed here, they found the natives busy in fishing for oysters. Columbus ordered some of the savages aboard his ship, who were so far from being terrified, that they very soon became familiar with the Spaniards. The latter at first imagined that the oysters served them for food; but on opening the shells, they found they contained valuable pearls. Upon this discovery they immediately landed, and found the natives ready to part with their pearls for the merest trifles. In process of time the Spaniards built a castle, called *Monpadre*, and employed prodigious numbers of Guinea and Angola negroes in the pearl fishery; cruelly forcing them to tear up the oysters from the rocks to which they stuck, during which time many of them were destroyed by the sharks and other voracious fishes. The present population is about 14,000; of whom 5500 are whites, 2000 Indians, and 6500 slaves and free persons of colour. It has for some time been in the hands of the party who are endeavouring to overturn the Spanish authority in Caraccas.

MARGARITA, the *Pearl*, in *Natural History*. See PEARL and MYA.

MARGARITINI, are glass ornaments, made at Venice, of small glass tubes of different colours, which are blown at Murano, and which the women of the lower class wear about their arms and necks. The largest sort are used for making rosaries. This work is performed with great dispatch, the artisan taking a whole handful of these tubes at once, and breaking them off one after another with an iron tool. These short cylinders are mixed with a kind of ashes, and put over the fire in an iron pan; and when the two ends begin to melt, by stirring them about with an iron wire, they are brought to a round figure; but care is taken not to leave them too long over the fire, lest the hole through which they are to be strung should be entirely closed by the melting of the glass. There are several streets at Francesco de Vigna entirely inhabited by people whose sole occupation is to make and string these margaritini.

MARGATE, a sea-port town of Kent, on the north side of the isle of Thanet, near the North Foreland. It is noted for shipping vast quantities of corn (most, if not all, the product of that island) for London; and has a salt-water bath at the post-house, which has performed great cures in nervous and paralytic cases, and numbness of the limbs. It lies in St John's parish, which is a member of the port of Dover, at the distance of 14 miles, 12 from Canterbury, and 72 from London. It has become one of the principal watering places for the idle, the opulent, and the invalid, where they meet with every requisite accommodation; and the adjacent country abounds with most extensive prospects and pleasant rides. The population in 1811 was 6126. E. Long. 1. 30. N. Lat. 51. 24.

MARHATTAS, MERHATTAHS, MARATTAS, or MAHRATTAS; a people of India, and by far the most considerable of all the Hindoo powers. The Marhattas boast a very high antiquity; they profess the religion of Brama; speak a dialect of the Sanscrit language, in which they have introduced all the technical terms of Mogul administration; use a character of their own in writing, though not very different from some of the other tribes around them; and are divided into four casts or classes of people, with the various subdivisions of professional distinction found over the rest of Hindostan; but with this remarkable difference, that among the Marhattas every individual may, as in fact he occasionally does, follow the life of a soldier. Marhattas.

As a nation inhabiting immemorially the country properly denominated *Marhat* or *Merhat*, and comprehending the greater part of the Paishwa's present dominions in the Decan, they were completely subjugated, and afterwards for many centuries depressed, first by the Patans, then by the Mogul conquerors of Delhi. At length, towards the end of Alemgeer's reign, they united, rebelled, and under the famous *Sewajee* or *Seeva-jee*, a leader of their own tribe, laid the foundations of their present vast empire, which has risen gradually on the ruins of the Mohamedan power, as related under the article HINDOSTAN.

Seeva-jee was succeeded by his son Rajah Sahou, who considerably extended the Marhatta dominions. When Rajah Sahou grew old and infirm, and the fatigues of government began to press heavy upon him, he appointed Bissonat Balajee, a Brahman born at Gokum, and leader of about 25,000 horse, to the office of Paishwa or vicegerent.

Rajah Sahou died without issue, but left nephews by his brother. The courage and wisdom of Balajee had gained him, during the latter years of the old rajah, the affection and esteem of all the nation. But, under an appearance of modesty and self-denial, his prevailing passion was ambition; and the sentiments of gratitude and loyalty were absorbed in the desire to command. He made use of the influence he had acquired under his benefactor so firmly to establish his own power, that he not only retained the high office of Paishwa during his life, but transmitted it to his posterity. The Marhattas, gradually forgetting a prince they knew nothing of, became accustomed to obey his vicegerent only: yet a certain respect for the royal race, or the dread of the consequences of violating the strong prejudice which the nation still retains in favour of the family of its founder, have served perhaps to preserve it; and the descendants of Rajah Sahou's nephews yet exist, but are kept in captivity in the palace at Sattarah. The eldest is styled Ram Rajah, or sovereign; his name is on the seal and coin of the Marhatta state; but his person is unknown, except to those who immediately surround him. He resides in his splendid prison, encompassed with the appendages of eastern grandeur, but debarred of all power, and kept totally ignorant of business. The seat of government was transferred from the ancient royal residence of Sattarah to Poonah; and the usurper, as well as his successors, seem still to have acted under the supposed authority of the deposed prince, by their assuming no other title or character than that of Paishwa or prime minister. From this change, the empire of the Ram Rajah has been distinguished only

Marhattas. by the appellation of the *Paishwaship*, or otherwise the *Government of Poonah*, from the name of its present capital.

Bissonat Balajee was succeeded as Paishwa by his eldest son Balajee Row (called also *Nana Saheb*, or *Nanah Row*), who left three sons, the eldest of whom, Balajee Pundit, sometimes called Nanah Pundit, succeeded him. The two others were Rogobah or Ragonat Row, and Shamsheer Row.

Balajee Puudit left two sons; Mahadava Row, who was Paishwa twelve years; and Narrain Row, who succeeded him.

During the latter part of the life of Mahadava Row, his uncle Rogobah was confined to the palace at Poonah, for reasons with which we are not acquainted. Mahadava Row died without issue; and upon the accession of Narrain his brother, a youth of about 19 years of age, Rogobah in vain applied to be released from his confinement. He is therefore suspected of having entered into a conspiracy with two officers in his nephew's service, Somair Jing and Yusuph Gardie, in order to procure that by force which he could not obtain by entreaty. The correspondence between the conspirators was carried on with so much secrecy, that the court had not the least intimation or suspicion of their design, till every avenue leading to the palace had been secured, and the whole building surrounded by the troops under the command of those two officers. It is said, that on the first alarm, Narrain Row, suspecting his uncle, ran to his apartment, threw himself at his feet, and implored his protection: "You are my uncle (said he), spare the blood of your own family, and take possession of a government which I am willing to resign to you."

Somair and Yusuph entered the room whilst the young Paishwa was in this suppliant posture. Rogobah, with apparent surprise and anger, ordered them to withdraw; but as they either knew him not to be sincere, or thought they had proceeded too far to retreat, they stabbed Narrain with their poniards whilst he clung to his uncle's knees.

The office of Paishwa being now vacant, the chiefs of the nation then at Poonah were assembled, and Rogobah being the only survivor of the family of Bissonat Balajee, to whose memory the Marhattas in those parts are enthusiastically attached, he was named to fill it. Being naturally of a warlike temper, he resolved to undertake some foreign expedition; for besides gratifying his passion for the field, he probably hoped, by the splendour of his exploits, to draw off the attention of the public from inquiring into the late catastrophe.

A pretence for war was not difficult to be found. He renewed the claim of his nation to the *chout*, and marched his army towards Hydrabad, the capital of the Nizam. The vigour of his measures procured him an accommodation of his demand; and he was proceeding to enforce a similar one upon the Carnatic, when he received intelligence which obliged him to return hastily to Poonah.

Although the Marhatta chiefs had acknowledged Rogobah as Paishwa, yet they and the people in general were much dissatisfied with his conduct. The murderers of Narrain Row had not only escaped punishment, but, as was reported, had been rewarded. Marhattas. The crime was unexampled, and the perpetrators were beheld with uncommon horror and detestation. The Paishwa had hitherto so fully possessed the love of the people, that, till then, guards were considered as unnecessary about the person of a man whose character rendered him inviolable. Every one therefore had free access to his palace, and he relied with confidence for his safety upon the affections of those who approached him.

These reflections operated powerfully upon the minds of the Marhattas; but perhaps no violent consequences would have ensued, had it not been discovered, soon after the departure of Rogobah from Poonah, that the widow of Narrain Row, Ganga Bace, was pregnant. This determined their wavering resolutions. Frequent consultations were held among the principal men then in the capital; and it was finally resolved to abjure the allegiance they had sworn to Rogobah, and declare the child, yet unborn, to be the legal successor of the late paishwa.

A council of regency was immediately appointed to govern the country until the child should become of age; and it was agreed to reserve their deliberations, in case it should prove a female or die, till the event should render them necessary. They who principally conducted these measures, and whose names will on that account be remembered, were Sackharam Babou and Balajee Pundit, called also Nanah Pher Nevees from his having been long the principal secretary of the Marhatta state. Nine other Marhatta leaders approved of these measures, and swore to maintain them.

As the first step towards the execution of their plan, the widow of Narrain Row was conveyed to Poorendher, a fort of great strength, situated on a high mountain, about 25 miles from Poonah. As soon as Rogobah received intimation of this revolution, he marched back towards the capital. But discontent had already infected his troops; some of the chiefs retired to their estates, and others joined the standard of the regents. He however risked a battle with an army of the revolters commanded by Trimbec Row, in which the latter was slain; but though he obtained a victory, the strength of the confederates daily increased, while his own troops were diminished by continual desertions. He therefore found it necessary to retire to Ugein, and to solicit the assistance of the Marhatta chiefs Scindia and Holkar; but meeting with a refusal, he went to Surat, and applied for succour to the English.

Rogobah's success in this application was the cause of two wars with the Marhatta state; which, after much waste of blood and treasure, we were obliged to conclude by relinquishing his claim, and acknowledging as legal paishwa the son of Narrain Row, who was born about seven months after the death of his father. See INDIA and HINDOSTAN.

The Marhatta dominions, as already observed, are governed by a number of separate chiefs, all of whom acknowledge the Ram Rajah as their sovereign; and all except Moodajee Boonsalah, own the paishwa as his vicegerent. The country immediately subject to the paishwa, including all the hereditary territories that were left by the Rajah Sahou to the Ram Rajah, and

Marhattas. and those that have been aequired and added to them since in his name, extends along the coast nearly from Goa to Cambay; on the south it borders on the possessions of Tippoo Saib, eastward on those of the Nizam and of the Marhatta rajah of Berar, and towards the north on those of the Marhatta chiefs Scindia and Holkar.

Moodajee Boonsalah, rajah of Berar, possessed, besides Berar, the greatest part of Orixa. This prince being descended from the line of the Ram Rajah, eyes the power of the paishwa, by whom a branch of his family is kept in ignominious confinement, with ill will; has often refused to support his measures; and, on some occasions, has even seemed inclined to act against him.

Next to Moodajee, in point of importance, must be ranked Madajee Scindia, a bold and aspiring chief, who possesses the greatest part of the extensive soubadary or government of Malva, together with part of the province of Candeish. The remainder is under the dominion of Holkar. Both he and Scindia pretend to be descended from the ancient kings of Malva. Scindia resides chiefly at Ugein, near the city of Mundu, once the capital of these kings; and Holkar at Indoor, a town little more than 30 miles west of it. The dominions of these, and of some chiefs of less consequence, extend as far as the river Jumna.

The measures pursued by the Marhattas for some years left little room to doubt that they aspired at the sovereignty of all Hindostan, or at least at the expulsion of the Mohamedan princes: And in this last design they appear to have succeeded*, and to have gained a great accession of territory, through the arms of Scindia, both by the capture of the cities of Agra and Delhi, with their territorial dependencies, and the consequent captivity of the unfortunate monarch who ruled there as the last imperial representative of the great Mogul race of Timur. "The whole of the dominion thus newly established is of vast extent, stretching near 1200 miles along the frontiers of Tippoo and the Nizam in a north-east direction, from Goa on the Malabar coast to Balasore in Orissa adjoining to Bengal; and from thence north-westerly 1000 miles more, touching the confines of the British and allied states, on the borders of the Ganges and Jumna, to the territory of the Seiks at Paniput, rendered famous in 1761 for the last memorable defeat sustained by the Marhattas in their ambitious contest for empire with the united declining power of the Mohamedans. From this place in a southerly course, with great encroachment on the old eastern boundary of the Rajepoot country of Ajmere, it runs about 260 miles to the little Hindoo principality of Kotta, and thence south-westerly 540 miles further to the extreme point of the soubah of Gujerat at Duarka, including the whole of that fertile province; from whence, along the sea-coasts of Cambay and Malabar to Goa, the distance may be reckoned 800 miles. Thus the overgrown empire of the Marhattas may be said to extend east 19 degrees of longitude, near the parallel of 22 degrees north latitude, from the mouths of the Indus to those of the Ganges; and about 13 degrees of latitude north, from the Kistnah to Paniput; comprehending at least an area of 400,000 square geographical miles, being considerably more than a third part of Hindostan, including the Decan, and equal perhaps in dimensions to all the British and allied states in India, with those of Golconda and Mysore, taken together. Marhattas || Maribone.

Such was the state of affairs in India so far as the Marhattas were concerned a few years ago. By consulting the history of India, the reader will observe, that the power and dominion of these enterprising chiefs have been since greatly abridged by the successful progress of the British arms. See INDIA.

MARIA, or SANCTA MARIA, an island of the Indian ocean, lying about five miles east from Madagascar. It is about 27 miles long and five broad; well watered, and surrounded by rocks. The air is extremely moist, for it rains almost every day. It is inhabited by 500 or 600 negroes, but seldom visited by ships.

MARIA, *St*, a considerable town of South America, in the audience of Panama, built by the Spaniards after they had discovered the gold mines near it, and soon after taken by the English. It is seated at the bottom of the gulf of St Michael, at the mouth of a river of the same name; which is navigable, and the largest that falls into the gulf. The Spaniards come here every year in the dry season, which continues three months, to gather the gold dust out of the sands of the neighbouring streams; and carry away great quantities. W. Long. 148. 30. N. Lat. 7. 0.

MARIA, *St*, a handsome and considerable town of Spain, in Andalusia, with a small castle. It was taken by the English and Dutch in 1702, for the archduke of Austria. It is seated on the Guadaleta, at the mouth of which is a tower and a close battery. W. Long. 5. 33. N. Lat. 36. 35.

MARIAN ISLANDS. See *LADRONE Islands*.

MARIANA, JOHN, a learned Spanish historian, born at Talavera in the diocese of Toledo. He entered among the Jesuits in 1554, at 17 years of age; and became one of the most learned men of his time. He was a great divine, a good humanist, and profoundly versed in ecclesiastical as well as profane history. He taught at Rome, in Sicily, at Paris, and in Spain; and died at Toledo in 1624. His principal works are, 1. An excellent history of Spain in 30 books: which he himself translated from the Latin into Spanish, without servilely following his own Latin edition. 2. *Scholia*, or short notes on the Bible. 3. A treatise on the changes the specie has undergone in Spain; for which he was thrown into prison by the duke of Lerma, the Spanish minister. 4. A famous treatise *De rege et regis institutione*, which made much noise, and was condemned by the parliament of Paris to be burnt by the hands of the common hangman, for his asserting in that work, that it is lawful to murder tyrants. 5. A work on the faults of the government of the society of Jesuits, which has been translated into Spanish, Latin, Italian, French, &c.

MARIANUS SCOTUS, an Irish monk, was related to the venerable Bede, and wrote a chronicle which is esteemed. He died in the abbey of Fuld in 1086, aged 58.

MARIBONE, or ST MARY LE BONE, or rather *Borne*, from the neighbouring brook, a parish of Middlesex, on the north-west side of London. The manor appears to have belonged anciently to the bishop of London.

* *An Historical and Political View of the Decan.*

Maribone || Marine.

London. The houses in this parish are very numerous, comprising several extensive streets and squares, which are every year increasing. The Paddington road from Islington passes through this parish, which gives it communication with the eastern part of London without passing through the streets. Here were three conduits erected about the year 1238, for supplying the city of London with water; but anno 1703, when it was plentifully served by the New River, the citizens let them out at 700l. a-year for 43 years. There were two for receiving its water at the north-east corner of the bridge on the river Tyburn, and over them stood the lord's mayor's banqueting house, to which (the use of coaches being not then known) his lordship and the aldermen use to ride on horseback, as their ladies did in waggons. This banqueting house, after being many years neglected, was taken down in 1737, and the cisterns arched over.

MARIDUNUM, in *Ancient Geography*, a town of the Demetæ in Britain. Now *Caer Mardin*, or *Caermarthen*, the capital of Caermarthenshire.

MARIETTA, a town in the United States of America, situated in the state of Ohio, at the junction of the Ohio river with the Muskingum. The town and township contained 1463 inhabitants in 1810. Sea-rigged vessels are built here, though it is 2000 miles inland.

MARIGALANTE, an island of North America, and one of the least of the Caribbees, lies in N. Lat. 16. 32. and W. Long. 61. 5. from London, at the distance of four leagues from Guadaloupe, to the south. The soil, produce, and climate, are pretty much the same as the other Caribbees. Columbus discovered it in his second American voyage in 1483, and called it by the name of his ship Maria Galauta, or Gallant Mary. It is about six leagues long, and between three and four broad. Viewed at a distance from on board a ship, it appears like a floating island, because, as it is for the most part flat, the trees seem to swim; but a nearer prospect shows it to be interseeted by some rising grounds, which give a fine variety to the landscape. The French settled here in 1648. It was taken by the British in 1759, but afterwards restored at the peace in 1763. It was taken again in 1808, and restored to France by the peace of Paris in 1814. —This island was thought, on its first discovery, to want water; but a charming running stream has in time been discovered, no less convenient than refreshing and wholesome, on the banks of which are some wealthy planters, and excellent plantations of sugar. A little village in a small bay is the capital of the island, and here the commandant resides. The whole island is very capable of improvement; the soil being almost equally good, and the land rising nowhere too high. The coast affords many little bays, and safe anchorage and shelter to ships.

MARINE, a general name for the navy of a kingdom or state; as also the whole economy of naval affairs; or whatever respects the building, rigging, arming, equipping, navigating, and fighting ships. It comprehends also the government of naval armaments, and the state of all the persons employed therein, whether civil or military.

The history of the marine affairs of any one state is a very comprehensive subject, much more that of all nations. Those who would be informed of the maritime affairs of Great Britain, and the figure it has made at sea in all ages, may find abundance of curious matter in Selden's *Mare Clausum;* and from his time to ours, we may trace a series of facts in Lediard's and Burchet's Naval History; but above all in the Lives of the Admirals, by the accurate and judicious Dr Campbell. Marine, Mariner.

MARINES, or *Marine Forces*, a body of soldiers raised for the sea service, and trained to fight either in a naval engagement or in an action ashore.

The great service of this useful corps was manifested frequently in the course of the war before last, particularly at the siege of Belleisle, where they acquired a great character, although lately raised and hardly exercised in military discipline. At sea they are incorporated with the ship's crew, of which they make a part: and many of them learn in a short time to be excellent seamen, to which their officers are ordered by the admiralty to encourage them, although no sea officer is to order them to go aloft against their inclination. In a sea fight their small arms are of very great advantage in scouring the decks of the enemy; and when they have been long enough at sea to stand firm when the ship rocks, they must be infinitely preferable to seamen if the enemy attempts to board, by raising a battalion with their fixed bayonets to oppose him.

The sole direction of the corps of marines is vested in the lords commissioners of the admiralty; and in the admiralty is a distinct apartment for this purpose. The secretary to the admiralty is likewise secretary to the marines, for which he has a salary of 300l. a-year; and he has under him several clerks for the management of this department.

The marine forces of Great Britain in the time of peace are stationed in three divisions; one of which is quartered at Chatham, one at Portsmouth, and another at Plymouth. By a late regulation, they are ordered to do duty at the several dock-yards of those ports, to prevent embezzlement of the king's stores, for which a captain's guard mounts every day; which certainly requires great vigilance, as so many abuses of this kind have been committed, that many of the inhabitants, who have been long used to an infamous traffic of this kind, expect these conveyances at certain periods as their due, and of course resent this regulation in the highest degree as an infringement of their liberties as British subjects.

The marine corps are under the command of their own field officers, who discipline them, and regulate their different duties. His late majesty in 1760 formed a new establishment of marine officers, entitled, the *general*, *lieutenant-general*, and *three colonels* of marines (one for each division), to be taken from officers in the royal navy. The two first are always enjoyed by flag officers, the last by post captains only. This establishment was formed to reward such officers who distinguished themselves in the service of their country.

Marine Discipline, is the training up soldiers for sea service, in such exercise as the various positions of the firelock and body, and teaching them every manœuvre that can be performed on board ships of war at sea. See Exercise.

Marine Chair, a machine invented by Mr Irwin for viewing the satellites of Jupiter at sea, and of course

Marine || Marino.

course determining the longitude by their eclipses. An account of it is given in the *Journal Estranger* for March 1760. An account of its accuracy was published in the year following by M. de l'Isle astronomer in the Imperial academy of Petersburgh: but notwithstanding the encomiums bestowed upon it by this gentleman, it hath never come into general use; and therefore we may conclude, that it is much inferior to the inventions of Mr Harrison for the same purpose. See HARRISON and LONGITUDE.

MARINE Surveyor, is the name of a machine contrived by Mr H. de Saumarez for measuring the way of a ship in the sea. This machine is in the form of the letter Y, and is made of iron, or any other metal. At each end of the lines which constitute the angle or upper part of that letter, are two pallets, not much unlike the figure of the log; one of which falls in the same proportion as the other rises. The falling or pendent pallet meeting a resistance from the water, as the ship moves, has by that means a circular motion under water, which is faster or slower according as the vessel moves. This motion is communicated to a dial within the ship, by means of a rope fastened to the tail of the Y, and carried to the dial. The motion being thus communicated to the dial, which has a bell in it, it strikes exactly the number of geometrical paces, miles, or leagues, which the ship has run. Thus the ship's distance is ascertained; and the forces of tides and currents may also be discovered by this instrument: which, however, has been very little used.

MARINE Acid, an old name given to muriatic acid, which see in CHEMISTRY *Index*.

MARINER, the same with a sailor or seaman. See these articles.

Method of preserving the health of MARINERS. See SEAMEN.

MARINER's Compass. See COMPASS.

ST MARINO, a small town and republic of Italy, situated in E. Long. 13. 44. N. Lat. 44. 21. This small republic consists only of a mountain, and a few hillocks, that lie scattered about the bottom of it. The number of the inhabitants is about 5000. The mountain yields good wine, but they have no other than rain or snow water. The founder of the republic was a Dalmatian, and a mason, who upwards of 1300 years ago turned hermit, and retired to this mountain. Here his devotion and austerity, and, in consequence of that, his reputation for sanctity, were such, that the princes of the country made him a present of the mountain; on which many, out of veneration for the saint, soon after took up their abode. Thus was the foundation laid of the town and republic, which still bears the name of the saint. The town stands on the top of the mountain, and there is only one way by which it can be come at. In the whole territory are only three castles, three convents, and five churches. The largest of the churches is dedicated to the saint, and contains his ashes and his statue. He is looked upon as the greatest saint, next to the blessed Virgin; and to speak disrespectfully of him is accounted blasphemy, and punished as such. The republic is under the protection of the pope. All that are capable of bearing arms are exercised, and ready at a minute's call. In the ordinary course of government, the administration is in the hands of the council of 60, which, notwithstanding its name, consists only of 40; one-half of the members of which are of the noble families, and the other of the plebeian: on extraordinary occasions, however, the arengo, in which every house has its representative, is called together. The two principal officers are the capitaneos, who are chosen every half year; and next to them is the commissary, who judges in civil and criminal matters, and is joined in commission with the capitaneos; both he and the physician must be foreigners, and both have their salaries out of the public stock. When any person, after due summons, neglects to assist at the the council according to their statute book, he is to be fined in about a penny English; and when an ambassador is to be sent to any foreign state, he is to be allowed about 1s. a-day.

Marino || Maritagium.

MARINO, John Baptist, a celebrated Italian poet, born at Naples in 1569. His father, who was an able civilian, obliged him to study the law; at which being disgusted, he left his parents, and retired to the house of the Sieur Manzi, who was a friend to all persons of wit. He at length became secretary to Matthew of Capua, great admiral of the kingdom of Naples, and contracted a friendship with Tasso. A short time after, he went to Rome, and entered into the service of Cardinal Aldobrandini, nephew to Pope Clement VIII. who took him with him to Savoy. Marino was in great favour with the court of Turin; but afterwards created himself many enemies there, the most furious of whom was the poet Gaspard Murtola, who, attempting to shoot him with a pistol, wounded one of the duke of Savoy's favourites. Marino being obliged to leave Turin, went to Paris at the desire of Queen Mary de Medicis, and published there his poem on Adonis. He afterwards went to Rome, where he was made prince of the academy of the humoristi; from thence to Naples, where he died while he was preparing to return home. He had a very lively imagination, but little judgment; and, giving way to the points and conceits then in vogue, his authority, far from correcting the false taste of the Italians, served rather to keep it farther from reformation. His works, which are numerous, have been often printed.

MARINUS, an engraver, who flourished about the year 1630, and resided principally at Antwerp. His plates, Mr Strutt observes, are executed in a very singular style, with the graver only: The strokes are very fine and delicate, and crossed over each other in a lozenge-like form, which he filled up with thin long dots. His prints, though generally very neat, want the style of the master in the determination of the folds of the draperies and the outline of the human figure; the extremities of which are heavy, and not marked with precision. Fine impressions from his best plates are, however, much sought after by collectors; those especially after Rubens and Jordaens are held in high estimation.

MARIONIS, in *Ancient Geography*, a town of Germany: now Hamburg, a famous trading city on the Elbe, in Lower Saxony, in the duchy of Holstein. Another Marionis (Ptolemy), thought to be Wismar, a town of Lower Saxony, in the duchy of Mecklenburgh.

MARJORAM, See ORIGANUM, BOTANY *Index*.

MARITAGIUM. In the feudal customs, *maritagium*

Maritagium, Maritime.

gium (as contradistinguished from *matrimonium*) signifies the power which the lord or guardian in chivalry had of disposing of his infant ward in matrimony. For while the infant was in ward, the guardian had the power of tendering him or her a suitable match without disparagement or inequality: which if the infants refused, they forfeited the value of the marriage, *valorem maritagii*, to their guardian; that is, so much as a jury would assess, or any one would *bona fide* give to the guardian for such an alliance: and if the infants married themselves without the guardian's consent, they forfeited double the value, *duplicem valorem maritagii*.

MARITIME, something relating to, or bounded by the sea. Thus a maritime province or country is one bounded by the sea; and a maritime kingdom is one that makes a considerable figure, or that is very powerful at sea. Hence, by *maritime* powers among the European states, are understood Great Britain and formerly Holland.

Maritime State, in British policy, one of the three general divisions of the laity: (See LAITY). This state is nearly connected with the military; though much more agreeable to the principles of our free constitution. The royal navy of England hath ever been its greatest defence and ornament; it is its ancient and natural strength; the floating bulwark of the island; an army from which, however strong and powerful, no danger can ever be apprehended to liberty; and accordingly it has been assiduously cultivated from earliest ages. To so much perfection was our naval reputation arrived in the 12th century, that the code of maritime laws, which are called the *laws of Oleron*, and are received by all nations in Europe as the ground and substruction of all their marine constitutions, was confessedly compiled by our king Richard I. at the isle of Oleron on the coast of France, then part of the possessions of the crown of England. And yet so vastly inferior were our ancestors in this point to the present age, that even in the maritime reign of Queen Elizabeth, Sir Edward Coke thinks it matter of boast, that the royal navy of England then consisted of *three and thirty ships*. The present condition of our marine is in great measure owing to the salutary provisions of the statutes called the *navigation acts*; whereby the constant increase of English shipping and seamen was not only encouraged, but rendered unavoidably necessary. By the statute 5 Richard II. c. 3. in order to augment the navy of England, then greatly diminished, it was ordained, that none of the king's liege people should ship any merchandise out of or into the realm, but only in ships of the king's ligeance, on pain of forfeiture. In the next year, by statute 6 Rich. II. c. 8. this wise provision was enervated, by only obliging the merchants to give English ships (if able and sufficient) the preference. But the most beneficial statute for the trade and commerce of these kingdoms is that navigation act, the rudiments of which were first framed in 1650, with a narrow partial view; being intended to mortify our own sugar islands, which were disaffected to the parliament, and still held out for Charles II. by stopping the gainful trade which they then carried on with the Dutch, and at the same time to clip the wings of those our opulent and aspiring neighbours. This prohibited all ships of foreign nations from trading with any English plantations, without license from the council of state. In 1651, the prohibition was extended also to the mother country: and no goods were suffered to be imported into England, or any of its dependencies, in any other than English bottoms; or in the ships of that European nation of which the merchandise imported was the genuine growth or manufacture. At the Restoration, the former provisions were continued, by stat. 12 Car. II. c. 18. with this very material improvement, that the master and three-fourths of the mariners shall also be English subjects.

Maritime.

Many laws have been made for the supply of the royal navy with seamen; for their regulation when on board; and to confer privileges and rewards on them during and after their service.

1. For their supply. The principal, but the most odious, though often necessary method for this purpose, is by impressing; see IMPRESSING. But there are other ways that tend to the increase of seamen, and manning the royal navy. Parishes may bind out poor boys apprentices to the masters of merchantmen, who shall be protected from impressing for the first three years; and if they are impressed afterwards, the masters shall be allowed their wages: great advantages in point of wages are given to volunteer seamen, in order to induce them to enter into his majesty's service: and every foreign seamen, who, during a war, shall serve two years in any man of war, merchantmen, or privateer, is naturalized *ipso facto*. About the middle of King William's reign, a scheme was set on foot for a register of seamen to the number of 30,000, for a constant and regular supply of the king's fleet; with great privileges to the registered men; and, on the other hand, heavy penalties in case of their non-appearance when called for; but this registry, being judged to be rather a badge of slavery, was abolished by stat. 9 Ann. c. 21.

2. The method of ordering seamen in the royal fleet, and keeping up a regular discipline there, is directed by certain express rules, articles, and orders, first enacted by the authority of parliament soon after the Restoration; but since new modelled and altered, after the peace of Aix-la-Chapelle, to remedy some defects which were of fatal consequences in conducting the preceding war. In these articles of the navy almost every possible offence is set down, and the punishment thereof annexed: in which respect the seamen have much the advantage over their brethren in the land service; whose articles of war are not enacted by parliament, but framed from time to time at the pleasure of the crown. Yet from whence this distinction arose, and why the executive power, which is limited so properly with regard to the navy, should be so extensive with regard to the army, it is hard to assign a reason: unless it proceeded from the perpetual establishment of the navy, which rendered a permanent law for their regulation expedient, and the temporary duration of the army, which subsisted only from year to year, and might therefore with less danger be subjected to discretionary government. But, whatever was apprehended at the first formation of the mutiny act, the regular renewal of our standing force at the entrance of every year has made this distinction idle.

For,

Maritime, Marius.

For, if from experience past, we may judge of future events, the army is now lastingly ingrafted into the British constitution; with this singularly fortunate circumstance, that any branch of the legislature may annually put an end to its legal existence, by refusing to concur in its continuance.

3. The privileges conferred on sailors, are pretty much the same with those conferred on soldiers, with regard to relief, when maimed, or wounded, or superannuated, either by county-rates, or the royal hospital at Greenwich; with regard also to the exercise of trades, and the power of making nuncupative testaments; and farther, no seaman on board his majesty's ships can be arrested for any debt, unless the same be sworn to amount at least to twenty pounds; though, by the annual mutiny acts, a soldier may be arrested for a debt which extends to half that value, but not to a less amount.

MARIUS, the famous Roman general, and seven times consul, who sullied his great military reputation by savage barbarities. He was born at Arpinum, of obscure and illiterate parents. He forsook the meaner occupations of the country for the camp; and signalized himself under Scipio, at the siege of Numantia. The Roman general saw the courage and intrepidity of young Marius, and foretold the era of his future greatness. By his seditions and intrigues at Rome, while he exercised the inferior offices of the state, he rendered himself known; and his marriage with Julia, who was of the family of the Cæsars, contributed in some manner to raise him to consequence. He passed into Africa as lieutenant to the consul Metellus against Jugurtha; and after he had there ingratiated himself with the soldiers, and raised enemies to his friend and benefactor, he returned to Rome and canvassed for the consulship. The extravagant promises he made to the people, and his malevolent insinuations about the conduct of Metellus, proved successful. He was elected and appointed to finish the war against Jugurtha. He showed himself capable in every degree to succeed to Metellus. Jugurtha was defeated, and afterwards betrayed into the hands of the Romans by the perfidy of Bocchus. No sooner was Jugurtha conquered, than new honours and fresh trophies awaited Marius. The provinces of Rome were suddenly invaded by an army of 300,000 barbarians, and Marius was the only man whose activity and boldness could resist so powerful an enemy. He was elected consul, and sent against the Teutones. The war was prolonged, and Marius was a third and fourth time invested with the consulship. At last two engagements were fought, and not less than 200,000 of the barbarian forces of the Ambrones and Teutones were slain in the field of battle, and 90,000 made prisoners. The following year, A. U. C. 651, was also marked by a total overthrow of the Cimbri, another horde of barbarians; in which 140,000 were slaughtered by the Romans, and 60,000 taken prisoners. After such honourable victories, Marius with his colleague Catullus entered Rome in triumph; and for his eminent services he received the appellation of the *third founder of Rome*. He was elected consul a sixth time; and as his intrepidity had delivered his country from its foreign enemies, he sought employment at home, and his restless ambition began to raise seditions, and to oppose the power of Sylla. This was the foundation of a civil war. Sylla refused to deliver up the command of his forces, with which he was empowered to prosecute the Mithridatic war; and he resolved to oppose in person the authors of a demand which he considered as arbitrary and improper. He advanced to Rome, and Marius was obliged to save his life by flight. The unfavourable winds prevented him from seeking a safer retreat in Africa, and he was left on the coast of Campania, where the emissaries of his enemy soon discovered him in a marsh, where he had plunged himself in the mud, and left only his mouth above the surface for respiration. He was violently dragged to the neighbouring town of Minturnæ; and the magistrates, all devoted to the interest of Sylla, passed sentence of immediate death on their magnanimous prisoner. A Gaul was commanded to cut off his head in the dungeon; but the stern countenance of Marius disarmed the courage of the executioner: and when he heard the exclamation of *Tune, homo, audes occidere Caium Marium?* the dagger dropped from his hand. Such an uncommon adventure moved the compassion of the inhabitants of Minturnæ. They released Marius from prison; and favoured his escape to Africa, where he joined his son Marius, who had been arming the princes of that country in his cause. Marius landed near the walls of Carthage, and he received no small consolation at the sight of the venerable ruins of a once powerful city, which like himself had been exposed to calamity, and felt the cruel vicissitude of fortune. This place of his retreat was soon known; and the governor of Africa, to conciliate the favour of Sylla, compelled Marius to fly to a neighbouring island. He soon after learned that Cinna had embraced his cause at Rome, when the Roman senate had stripped him of his consular dignity, and bestowed it upon one of his enemies. This intelligence animated Marius; he set sail to assist his friend only at the head of 1000 men. His army, however, was soon increased, and he entered Rome like a conqueror. His enemies were inhumanly sacrificed to his fury; Rome was filled with blood; and he, who once had been called the father of his country, marched through the streets of the city, attended by a number of assassins, who immediately slaughtered all those whose salutations were not answered by their leader. Such were the signals for bloodshed. When Marius and Cinna had sufficiently gratified their resentment, they made themselves consuls; but Marius, already worn out with old age and infirmities, died sixteen days after he had been honoured with the consular dignity for the seventh time, A. U. C. 666. Such was the end of Marius, who rendered himself conspicuous by his victories and by his cruelty. As he was brought up in poverty and among peasants, it will not appear wonderful that he always betrayed rusticity in his behaviour, and despised in others those polished manners and that studied address, which education had denied him. He hated the conversation of the learned only because he was illiterate; and if he appeared an example of sobriety and temperance, he owed these advantages to the years of obscurity which he passed at Arpinum. His countenance was stern, his voice firm and imperious, and his disposition untractable. He was in the 70th year of his age when he died; and Rome seemed to rejoice at

Marius.

Marius || Mark.

the fall of a man whose ambition had proved so fatal to many of her citizens. His only qualifications were those of a great general; and with these he rendered himself the most illustrious and powerful of the Romans, because he was the only one whose ferocity seemed capable to oppose the barbarians of the north.

MARIUS, C. the son of the great Marius, was as cruel as his father, and shared his good and his adverse fortune. He made himself consul in the 25th year of his age, and murdered all the senators who opposed his ambitious views. He was defeated by Sylla, and fled to Prænestе, where he killed himself.

MARIUS, *M. Aurelius*, a native of Gaul; who, from the mean employment of a blacksmith, became one of the generals of Gallienus, and at last caused himself to be saluted emperor. Three days after this elevation, a man who had shared his poverty without partaking of his more prosperous fortune, publicly assassinated him, and he was killed by a sword which he himself had made in the time of his obscurity. Marius has been often celebrated for his great strength; and it is confidently reported, that he could stop, with one of his fingers only, the wheel of a chariot in its most rapid course.

MARIUS, *Maximus*, a Latin writer, who published an account of the Roman emperors from Trajan to Alexander, now lost. His compositions were entertaining, and executed with great exactness and fidelity. Some have accused him of inattention, and complain that his writings abounded with many fabulous and insignificant stories.

MARIVAUX, PETER CARLET DE, a French writer in the dramatic way and in romance, was born of a good family at Paris in 1688. A fine understanding, well improved by education, distinguished him early. His first object was the theatre, where he met with the highest success in comic productions; and these, with the merit of his other works, procured him a place in the French academy. The great characteristic of both his comedies and romance was, to convey an useful moral under the veil of wit and sentiment: "My only object (says he) is to make men more just and more humane;" and he was as amiable in his life and conversation as he was in his writings. He died at Paris in 1763, aged 75. His works consist of, 1. *Pieces de Theatre*, 4 vols. 12mo. 2. *Homere travesti*, 12mo; which is not supposed to have done much honour to his taste. 3. *Le Spectateur François*, 2 vols. 12mo. 4. *Le Philosophe Indegent*, 12mo. 5. *Vie de Marianne*, 2 vols. 12mo; one of the best romances in the French language. 6. *Le Paysan Parvenu*, 12mo. 7. *Pharsamon;* inferior to the former.

MARK, ST, was by birth a Jew, and descended of the tribe of Levi. He was converted by some of the apostles, probably by St Peter; to whom he was a constant companion in all his travels, supplying the place of an amanuensis and interpreter. He was by St Peter sent into Egypt, fixing his chief residence at Alexandria, and the places thereabout; where he was so successful in his ministry, that he converted multitudes both of men and women. He afterwards removed westwards, towards the parts of Libya, going through the countries of Marmorica, Pentapolis, and others thereabouts; where, notwithstanding the barbarity and idolatry of the inhabitants, he planted the gospel. Upon his return to Alexandria, he ordered the affairs of that church, and there suffered martyrdom in the following manner. About Easter, at the time the solemnities of Serapis were celebrated, the idolatrous people, being excited to vindicate the honour of their deity, broke in upon St Mark, while he was performing divine service, and binding him with cords, dragged him through the streets, and thrust him into prison, where in the night he had the comfort of a divine vision. Next day the enraged multitude used him in the same manner, till, his spirits failing, he expired under their hands. Some add, that they burnt his body, and that the Christians decently interred his bones and ashes near the place where he used to preach. This happened in the year of Christ 68. Some writers assert, that the remains of St Mark were afterwards, with great pomp, translated from Alexandria to Venice. However, he is the tutelar saint and patron of that republic, and has a very rich and stately church erected to his memory. This apostle is author of one of the four gospels inscribed with his name. See the following article. Mark.

St MARK's Gospel, a canonical book of the New Testament, being one of the four gospels.

St Mark wrote his gospel at Rome, where he accompanied St Peter in the year of Christ 44. Tertullian and others pretend, that St Mark was no more than an amanuensis to St Peter, who dictated this gospel to him; others affirm, that he wrote it after St Peter's death. Nor are the learned less divided as to the language it was written in; some affirming that it was composed in Greek, others in Latin. Several of the ancient heretics received only the gospel of St Mark: others, among the Catholics, rejected the 12 last verses of this gospel. The gospel of St Mark is properly an abridgement of that of St Matthew.

St MARK the Evangelist's Day, a festival of the Christian church, observed April 25.

Canons of St MARK, a congregation of regular canons founded at Mantua, by Albert Spinola, a priest, towards the end of the 12th century. Spinola made a rule for them, which was approved, corrected, and confirmed by several succeeding popes. About the year 1450 they were reformed, and followed only the rule of St Augustine. This congregation having flourished for the space of 400 years, declined by little and little, and is now become extinct.

Knights of St MARK, an order of knighthood in the republic of Venice, under the protection of St Mark the evangelist. The arms of the order are, gules, a lion winged or; with this device, PAX TIBI MARCE EVANGELISTA. This order is never conferred but on those who have done signal service to the commonwealth.

MARK, or *Marc*, in commerce, denotes a weight used in several states of Europe, and for several commodities, especially gold and silver. In France, the mark is divided into eight ounces, 64 drachms, 192 deniers or penny-weights, 160 esterlius, 300 mails, 640 felins, or 4608 grains. In Holland, the mark weight is also called *Troy-weight*, and is equal to that of France. When gold and silver are sold by the mark, it is divided into 25 carats.

MARK

Mark || Marlborough.

MARK is also used among us for a money of account, and in some other countries for a coin. See *Money-Table*.

The English mark is two-thirds of a pound sterling, or 13s. 4d.; and the Scotch mark is of equal value in Scots money of account, viz. 13⅓d.

MARKET, a public place in a city or town, in which live cattle, provisions, or other goods, are set to sale; and also a privilege, either by grant or prescription, by which a town is enabled to keep a market.

Court of the Clerk of the Market, is incident to every fair and market in the kingdom, to punish misdemeanors therein; and a court of *pie poudre* is to determine all disputes relating to private or civil property. The object of this jurisdiction (see stat. 17 Car. II. cap. 10. 22 Car. II. cap. 8. 23 Car. II. cap. 12). is principally the cognizance of weights and measures to try whether they be according to the true standard thereof or not; which standard was anciently committed to the custody of the bishop, who appointed some clerk under him to inspect the abuse of them more narrowly; and hence this officer, though now usually a layman, is called the clerk of the market.—If they be not according to the standard, then, beside the punishment of the party by fine, the weights and measures themselves ought to be burnt. This is the lowest court of criminal jurisdiction in the kingdom.

MARKLAND, JEREMIAH, one of the most learned scholars and acute critics of the age, was born in 1692, and received his education in Christ's hospital. He became first publicly known by his *Epistola Critica*, addressed to Bishop Hare. In this he gave many proofs of extensive erudition and critical sagacity. He afterwards published an edition of Statius, and some plays of Euripides; and assisted Dr Taylor in his editions of Lysias and Demosthenes, by the notes which he communicated to him. He has also very happily elucidated some passages in the New Testament, which may be found in Mr Boyer's edition of it; and was author of a very valuable volume of remarks on the epistles of Cicero to Brutus, and of an excellent little treatise under the title of *Quæstio Grammatica*. He died in 1775, at Milton near Dorking in Surry; and was a man not more valued for his universal reading, than beloved for the excellency of his heart and primitive simplicity of his manners.

MARLBOROUGH, a town of Wiltshire in England, situated near the source of the Kennet, at the foot of a chalky hill, 75 miles from London. It has its name from the chalky soil, which was formerly called *marl*. It was a Romish station. In the year 1627 a parliament was held in the castle here, which made those laws called *Marlborough statutes*. There are still some small remains of its walls and ditch. The town, which is an ancient borough by prescription, sends two members to parliament. It contained, in 1811, 2579 inhabitants; and is governed by a mayor, two justices, twelve aldermen, &c. It consists chiefly of one broad street, with piazzas all along one side of it, two parish churches, and several commodious inns, it being the grand thoroughfare from London to Bath and Bristol. To the south are some relicks of a priory, particularly the Gatehouse; and the site of a Roman castrum, the foundations of which have been discovered there, with Roman coins. The ditchis still in some parts 20 feet wide; and towards the river, without the garden walls, one angle of the castrum is very visible with the rampart and ditch entire. The mount at the west end of the town, which was the keep or main guard of the castle, is converted into a pretty spiral walk; at the top of which is an octagon summer house. This town has often suffered by fire, particularly in 1690, whereupon the parliament passed an act to prevent its houses from being thatched. Marlborough || Marlow.

MARLBOROUGH, *Duke of*. See CHURCHILL.

Marlborough-Fort, an English factory on the west coast of the island of Sumatra in Asia; seated three miles west of the town of Bencoolen. E. Long. 101. 12. S. Lat. 4. 21.

MARLE, a mixture of calcareous with siliceous and argillaceous earth, very much used in agriculture as a manure. See AGRICULTURE and MINERALOGY *Index*.

MARLINE, in sea affairs, are tarred white skains, or long wreaths or lines of untwisted hemp, dipped in pitch or tar, with which cables or other ropes are wrapped round, to prevent their fretting or rubbing in the blocks or pulleys through which they pass. The same serves in artillery upon ropes used for rigging gins, usually put up in small parcels called *skains*.

MARLOE, CHRISTOPHER, an English dramatic author, was a student in the university of Cambridge; but afterwards turning player, he trode the same stage with the inimitable Shakespeare. He was accounted an excellent poet even by Ben Johnson himself. He wrote six tragedies, one of which called Lust's Dominion, or the Lascivious Queen, has been altered by Mrs Behn, and acted under the title of Abdelazar, or the Moor's Revenge. Some time before his death, he had made a considerable progress in an excellent poem entitled Hero and Leander: which was afterwards finished by George Chapman, who is said to have fallen short of the spirit and invention discovered by Marloe. Mr Anthony Wood represents him as a freethinker, in the worst sense of the word; and gives the following account of his death. Falling deeply in love with a low girl, and having for his rival a fellow in livery, Marloe, imagining that his mistress granted him favours, was fired with jealousy, and rushed upon him in order to stab him with his dagger: but the footman avoided the stroke, and, seizing his wrist, stabbed him with his own weapon; of which wound he died, in the year 1593.

MARLOW, a town of Buckinghamshire, in England, 31 miles from London, lies under the Chiltern hills, in a marly soil. It is a pretty large borough, though not incorporated, with a bridge over the Thames, not far from its conflux with Wycomb, and has a handsome church and town-hall. It first sent members to parliament in the reign of Edward II. Bone lace is its chief manufacture. The Thames brings goods hither from the neighbouring towns, especially great quantities of meal and malt from High Wycomb, and beech from several parts of the county, which abounds with this wood more than any in England. In the neighbourhood are frequent horse races; and here are several corn and paper-mills, particularly

Marlow, Marly.

on the river Loddon, between this town and High Wycomb. There are, besides, the Temple-mills for making thimbles, and another for pressing oil from rape and flax seeds. The population in 1811 was 2799.

At Great Marlow there is an institution supported by government for the education of young men destined for the army. The pupils are entirely under military discipline, and are instructed by able professors in the various branches of education connected with military tactics.

MARLY, a palace belonging to the king of France, between Versailles and St Germain; seated in a valley, near a village and forest of the same name. It is noted for its fine gardens and water-works, there being a curious machine on the river Seine, which not only supplies them with water, but also those of Versailles. It is 10 miles north-west of Paris. E. Long. 2. 11. N. Lat. 48. 52.

Marly, Machine at. When Lewis the Great had fixed upon a favourite situation in the forest of Marly, where he intended to erect a splendid castle, he found that it wanted nothing either in point of beauty or convenience but a fountain of water; and he immediately determined to supply by the assistance of art what nature had denied it. An ingenious and self-taught carpenter from Liege, named Rannequin, undertook to conduct from the Seine a copious supply of water, and for this purpose contrived and erected the celebrated and complicated machine which we are now to describe.

The machinery is driven by 14 undershot water wheels of 36 feet diameter, reckoning from the ends of the floatboards, disposed in three rows. In the first row there are seven wheels, in the second six, and in the third only one. By these wheels the water is raised through pumps into the first reservoir about 160 feet above the level of the river, then to a second reservoir 346 feet high, and from this to the summit of a tower about 533 feet above the Seine.

The two extremities of the axle of each wheel extend beyond the gudgeons on which they rest, and are bent into a crank so as to form a lever two feet long. The crank which is towards the mountain drives the water of the river into the first reservoir, and the other crank gives motion to the balances.

An engine of eight pumps is wrought by one of the cranks of each of the six wheels in the first row. These engines consist of a balance, at each end of which hangs a square piece of wood that supports and directs four pistons. This balance is moved by a beam in the form of a T, the horizontal part of which is connected at one end with the balance by the intervention of a vertical regulator or beam, and at the other with the crank of the wheel by means of a horizontal iron rod.

One of the cranks of each of the *six wheels* of the first row, (excepting that which is next the mountain), and two of the cranks of the 14th wheel, or that in the last row, give motion to the pumps in the river, and carry the water into the first reservoir. This motion is communicated from the cranks by means of an iron rod which is fixed to the lower end of a vertical balance. A horizontal regulator or beam is fixed to each end of this balance, and to these regulators are fastened chains which follow the declivity of the mountain till they reach the superior reservoirs. When the wheel is revolving, therefore, one of these chains will be dragged towards the river, and the other towards the mountain. In order to produce this alternate motion, the chains are supported and kept at equal distances by a number of vertical balances, placed along the mountain at every three toises, and moving upon a centre supported by a frame lying between the two chains and equidistant from them. When these chains reach the first reservoir they are fixed to vertical regulators, which carry frames, to which are adapted the pistons of the sucking pumps. These regulators therefore will be drawn one after another by their corresponding chains; and when one regulator is drawn by its chain, the piston of the pumps which it carries will be raised, and the water will follow them: At the same time the pistons of the other regulator are descending to form a vacuum; and these in their turn ascend with their load of water when the others are in the act of descending. In the pumps formerly mentioned which work in the river, an effect is produced upon the pistons both when they ascend and descend, because they are moved by stiff iron rods; but in the present case the pistons descend merely by their own weight, as the motion is transmitted only by a chain. By these pumps the water is conveyed to the upper reservoir by two conduit pipes of eight inches, and three others of six inches diameter. Marly.

The *sixth wheel* of the first row, which is the first towards the dam, moves a long chain which works the pumps of one of the wells of the upper reservoir. The seventh wheel gives motion to a chain which goes to the first cistern.

By means similar to these already described, the six wheels of the second row move by each of their cranks a chain that goes to the second reservoir, and eight of these chains work 16 pumps behind it, to bring back into the reservoir the water which is lost out of the six pipes that go to the tower. These chains go over one of the first cisterns, and five of them at the same time give motion to the pistons of thirty pumps, whilst the other chains go on straight to the great reservoir. These 30 pumps convey their water through two pipes of 8 inches diameter into the upper reservoir. The five chains, after working these 30 pumps, give motion to the pistons of 82 pumps in the second reservoir which raise the water from it to the tower.

The basis of the tower which receives the water raised from the river is 610 fathoms distant from it; and the water runs from this bason along an aqueduct of 36 arches by its own weight. From this aqueduct the water is distributed into great reservoirs, from which it is conveyed to the gardens and shrubberies around the castle.

The quantity of water raised by this machine amounts at a mean rate to 30,000 or 40,000 gallons per hour; though in favourable circumstances it raises more than 60,000 gallons per hour. But while the Seine either overflows its banks, or is frozen, or when the water is very low, the machine is scarcely capable of performing any work.

The yearly expence of the machine at Marly including the salaries of the superintendants and the expences of repairs, amounts to about 3300l. sterling, or 9l. per day, which makes the expence of 90 gallons of water one farthing. But if we take into the account the interest

Marly || Marobudun.

interest of 333,000l. the original expence of the machine, 90 gallons will cost three halfpence, or 15 gallons one farthing.

Notwithstanding the magnificence of this great machine, and the ingenuity which is displayed in its construction, every person who examines it with care, will perceive innumerable defects, whether he examines it as a whole, or attends to the parts of which it is composed. In several positions the moving forces act with great obliquity, and therefore occasion an immense waste of power; and in order to give an alternate motion to a number of chains of balances extending to a distance of 3804 feet, more than nine-tenths of the impelling power are destroyed.

By a few changes upon the construction of the machine, the water might have been raised from the river to the tower without any intermediate reservoirs. This appears from two experiments made upon the machine in 1738 and 1775. In 1738 M. Camus attempted to raise the water to the tower at once. He was able, however, only to bring it to the bottom of the tower which was considerably higher than the second reservoir. By this experiment the machine was so much strained that several parts required chains to secure it. In 1775 the water was elevated to the second reservoir at one jet at different times, but from the age and infirmity of the pipes several of them burst during the experiment. Hence it is obvious that if the pipes had been made stronger, the first reservoir and the machinery connected with it might have been dispensed with; and it is very probable that if the machine had been constructed with more judgment, the water might have been conducted at once from the river to the tower.

MARMALADE, a confection of plums, apricots, quinces, &c. boiled up to a consistence with sugar. In Scotland, it is made of Seville oranges and sugar only.

MARMANDE, a town of France, in the department of Lot and Garonne, containing about 4000 inhabitants. It carries on a great trade in corn and wine, and is seated on the river Garonne, in E. Long. 0. 15. N. Lat. 44. 30.

MARMONTEL, a French writer. See SUPPLEMENT.

MARMORA, the name of four islands of Asia, in the sea of the same name. The largest is about 30 miles in circumference; and the soil of them all produces corn, wine, and fruits. The sea of Marmora is a large gulf, which communicates both with the Archipelago and the Black sea by that of Constantinople, being 120 miles in length and 50 in breadth; and all ships must pass through it that sail to Constantinople from the Mediterranean. It was anciently the *Propontis*.

MARMORICA, a country of Africa anciently inhabited by the Libyans. It was bounded on the east by Egypt, on the west by Cyrenaica, on the south by Sahara, or the desert of Libya Interior, and on the north by the Mediterranean; and was reckoned a part of Egypt.

MARNE, the name of two departments in France, and also of a river which has its origin in one of them.

MAROBUDUN, in *Ancient Geography*, the royal residence of Marobudus, king of the Marcomanni. Now thought to be *Prague*, the capital of Bohemia.

MAROLLES, MICHEL DE, born in 1600, was the son of Claude de Marolles, whom French memoirs make a military hero. Michel, however, was of a different composition. He entered early into the ecclesiastical state, and by the interest of his father obtained two abbeys. He was formed with an extreme ardour for study, which never abated all his life long: for, from 1619 when he published a translation of Lucan, to 1681, the year of his death, he was constantly employed in writing and printing. He attached himself unfortunately to the translating of ancient Latin writers: but, being devoid of all classical taste and spirit, they sunk miserably under his hands, the poets especially. He was certainly, however, a man of great learning, and discovered all his life a love for the arts. He was one of the first who paid any attention to prints; and collected about 100,000, which make at this day one of the ornaments of the French king's cabinet. He composed memoirs of his own life, which were published by the abbé Goujet, 1755, in 3 vols. Marolles || Maronites.

MARONITES, in ecclesiastical history, a sect of eastern Christians, who follow the Syrian rite, and are subject to the pope; their principal habitation being on Mount Libanus.

Mosheim informs us, that the doctrine of the Monothelites, condemned and exploded by the council of Constantinople, found a place of refuge among the Mardaites, a people who inhabited the mounts Libanus and Antilibanus, and who, about the conclusion of the seventh century, were called *Maronites*, after *Maro* their first bishop; a name which they still retain. None (he says) of the ancient writers give any certain account of the first person who instructed these mountaineers in the doctrine of the Monothelites: it is probable, however, from several circumstances, that it was John Maro, whose name they had adopted; and that this ecclesiastic received the name of Maro from his having lived in the character of a monk in the famous convent of St Maro, upon the borders of the Orontes, before his settlement among the Mardaites of Mount Libanus. One thing is certain, from the testimony of Tyrius and other unexceptionable witnesses, as also from the most authentic records, viz. that the Maronites retained the opinions of the Monothelites until the 12th century, when, abandoning and renouncing the doctrine of one will in Christ, they were readmitted in the year 1182 to the communion of the Roman church. The most learned of the modern Maronites have left no method unemployed to defend their church against this accusation; they have laboured to prove, by a variety of testimonies, that their ancestors always persevered in the Catholic faith, in their attachment to the Roman pontiff, without ever adopting the doctrine of the Monophysites, or Monothelites. But all their efforts are insufficient to prove the truth of these assertions to such as have any acquaintance with the history of the church and the records of ancient times; for to all such the testimonies they allege will appear absolutely fictitious and destitute of authority.

Faustus Nairon, a Maronite settled at Rome, has published an apology for Maro and the rest of his nation. His tenet is, that they really took their name from the Maro who lived about the year 400, and of whom mention is made in Chrysostom, Theodoret, and

Maronites, Maroon.

and the Menologium of the Greeks. He adds, that the disciples of this Maro spread themselves throughout all Syria; that they built several monasteries, and among others, one that bore the name of their leader; that all the Syrians who were not tainted with heresy took refuge among them; and that for this reason the heretics of those times called them Maronites.

Mosheim observes, that the subjection of the Maronites to the spiritual jurisdiction of the Roman pontiff was agreed to with this express condition, that neither the popes nor their emissaries should pretend to change or abolish any thing that related to the ancient rites, moral precepts, or religious opinions, of this people, so that in reality there is nothing to be found among the Maronites that savours of popery, if we except their attachment to the Roman pontiff, who is obliged to pay very dear for their friendship. For, as the Maronites live in the utmost distress of poverty, under the tyrannical yoke of the Mahometans, the bishop of Rome is under the necessity of furnishing them with such subsidies as may appease their oppressors, procure a subsistence for their bishop and clergy, provide all things requisite for the support of their churches, and the uninterrupted exercise of public worship, and contribute in general to lessen their misery. It is certain that there are Maronites in Syria who still behold the church of Rome with the greatest aversion and abhorrence; nay, what is still more remarkable, great numbers of that nation residing in Italy, even under the eye of the pontiff, opposed his authority during the last century, and threw the court of Rome into great perplexity. One body of these nonconforming Maronites retired into the valleys of Piedmont, where they joined the Waldenses; another, above 600 in number, with a bishop and several ecclesiastics at their head, fled into Corsica, and implored the protection of the republic of Genoa against the violence of the inquisitors.

The Maronites have a patriarch, who resides in the monastery of Cannubin, on Mount Libanus, and assumes the title of patriarch of Antioch, and the name of Peter, as if he seemed desirous of being considered as the successor of that apostle. He is elected by the clergy and the people, according to the ancient custom; but, since their reunion with the church of Rome, he is obliged to have a bull of confirmation from the pope. He keeps a perpetual celibacy, as well as the rest of the bishops his suffragans: as to the rest of the ecclesiastics, they are allowed to marry before ordination; and yet the monastic life is in great esteem among them. Their monks are of the order of St Anthony, and live in the most obscure places in the mountains, far from the commerce of the world.

As to their faith, they agree in the main with the rest of the eastern church. Their priests do not say mass singly; but all say it together, standing round the altar. They communicate in unleavened bread; and the laity have hitherto partaken in both kinds, though the practice of communicating in one has of late been getting footing, having been introduced by little and little. In Lent they eat nothing, unless it be two or three hours before sunrising: their other fastings are very numerous.

To MAROON, to put one or more sailors ashore upon a desolate island, under pretence of their having committed some great crime. This detestable expedient has been too often practised by some inhuman commanders of ships.

Maroon || Marque.

MAROT, CLEMENT, the best French poet of his time, was born at Cahors in 1495; and was the son of John Marot, valet de chambre to Francis I. and poet to Queen Anne of Brittany. He enjoyed his father's place as valet de chambre to Francis I. and was page to Margaret of France wife to the duke of Alençon. In 1521 he followed that prince into Italy, and was wounded and taken prisoner at the battle of Pavia; but at his return to Paris was accused of heresy, and thrown into prison, from whence he was delivered by the protection of King Francis I. He at length retired to the queen of Navarre, then to the duchess of Ferrara, and in 1536 returned to Paris: but declaring openly for the Calvinists, he was obliged to fly to Geneva; which he at length left, and retiring to Piedmont, died at Turin in 1544, aged 50. His verses are agreeably filled with natural beauties. La Fontaine acknowledged himself his disciple, and contributed greatly to restore to vogue the works of this ancient poet. Marot, besides his other works, has translated part of the Psalms into verse, which was continued by Beza, and are still sung in the Protestant churches abroad.—*Michael Marot*, his son, was also the author of some verses; but they are not comparable to those of *John*, and much less to those of *Clement Marot*.—The works of the three *Marots* were collected and printed together at the Hague in 1731, in 3 vols. 4to, and in 6 vols. 12mo.

MARPURG, a strong and considerable town of Germany, in the Upper Rhine, and in the landgravate of Hesse Cassel, with an university, a castle, a palace, a handsome square, and a magnificent town-house. It is is seated on the river Lohn, in a pleasant country, 15 miles south of Waldeck, and 47 south-east of Cassel. E. Long. 8. 53. N. Lat. 50. 42.

MARPURG, a town of Germany, in Lower Styria, seated on the river Drave, 25 miles south-west of Gratz, and 60 north-east of Laubach. E. Long. 16. 10. N. Lat. 46. 42.

MARQUARD, FREHER, an eminent German civilian, born at Augsburg in 1565. He studied at Bourges, under the learned Cujas; and acquired great skill in polite literature, and in the laws. At his return to Germany, he became counsellor to the elector Palatine, and professor of law at Heidelberg; and was afterwards sent by the elector Frederic IV. as his minister, into Poland, to Mentz, and several other courts. He died at Heidelberg in 1614. He wrote many works which are esteemed; the principal of which are, 1. *De re monetaria veterum Romanorum, et hodierni apud Germanos imperii.* 2. *Rerum Bohemicarum scriptores.* 3. *Rerum Germanicarum scriptores.* 4. *Corpus historiæ Franciæ, &c.*

MARQUE, or *Letters of* MARQUE, in military affairs, are letters of reprisal, granting the subjects of one prince or state liberty to make reprisals on those of another.—They are so called from the German *marcke* "limit, frontier;" as being *jus concessum in alterius principis marckas seu limites transcundi, sibique jus faciendi;* as being a right of passing the limits or frontiers of another prince, and doing one's self justice.

Letters of marque among us are extraordinary commissions

Marque, Marquesas.

missions granted by authority for reparation to merchants taken and despoiled by strangers at sea; and reprisals is only the retaking, or taking of one thing for another*. The form in these cases is, the sufferer must first apply to the lord privy seal, and he shall make out letters of request under the privy-seal; and if, after such request of satisfaction made, the party required do not, within convenient time, make due satisfaction or restitution to the party grieved, the lord chancellor shall make him out letters of marque under the great seal; and by virtue of these he may attack and seize the property of the aggressor nation, without hazard of being condemned as a robber or pirate.

* See *Prerogative.*

MARQUESAS ISLANDS, the name of certain islands in the South sea, lying between 8 and 10 degrees of south latitude, and between 139 and 140 degrees of west longitude. They are five in number, viz. La Magdalena, St Pedro, La Dominica, Santa Christina, and Hood island. All the natives of these islands may be supposed to be of the same tribe. Those spots that are fit for culture are very populous; but every island is very mountainous, and has many inaccessible and barren rocks; and the whole population is believed not to exceed 6000. The Spaniards, who first visited here, found the manners of this people gentle and inoffensive; but these qualities did not prevent those who landed from wantonly butchering several of the natives at Magdalena.

The inhabitants of these islands collectively, says Captain Cook, are without exception, the finest race of people in the South sea. For symmetry of shape, and regular features, they perhaps surpass all other nations. Not a single deformed or ill-proportioned person was seen on the island; all were strong, tall, well-limbed, and remarkably active. The men are about five feet ten or six feet high; their teeth are not so good, nor are their eyes so full and lively, as those of many other nations: their hair is of many colours, but none red; some have it long, but the most general custom is to wear it short, except a bunch on each side of the crown, which they tie in a knot: their countenances are pleasing, open, and full of vivacity; they are of a tawney complexion, which is rendered almost black by punctures over the whole body. They were entirely naked, except a small piece of cloth round their waist and loins. The punctures were disposed with the utmost regularity, so that the marks on each leg, arm, and cheek, were exactly similar. The women, in two days time, began to appear in considerable numbers, and the sailors found them not less kind than those of the other islands which they had visited: they were inferior to the men in stature, but well proportioned: their general colour was brown; no punctures were observed upon them; they wore a single piece of cloth made of the mulberry bark, which covered them from the shoulders to the knees.

The principal head dress used in the islands, and what appears to be their chief ornament, is a sort of broad fillet, curiously made of the fibres of the husks of cocoa nuts; in the front is fixed a mother-of-pearl shell, wrought round to the size of a tea saucer; before that another smaller, of very fine tortoiseshell, perforated into curious figures; also before, and in the centre of that, is another round piece of mother-of-pearl, about the size of half a crown; and before this another piece of perforated tortoiseshell, the size of a shilling. Besides this decoration in front, some have it also on each side, but in small pieces; and all have fixed to them the tail feathers of cocks, or tropic birds, which, when the fillet is tied on, stand upright, so that the whole together makes a very sprightly ornament. They wear round the neck a kind of ruff or necklace made of light wood, the outward and upper sides covered with small pease, which are fixed on with gum; they also wear some bunches of human hair fastened to a string, and tied round the legs and arms. But all the above ornaments are seldom seen on the same person. All these ornaments, except the last, they freely parted with for a trifling consideration; but the human hair they valued very highly, though these bunches were the usual residence of many vermine. It is probable, that these were worn in remembrance of their deceased relations, and therefore were looked upon with some veneration; or they may be the spoils of their enemies, worn as the honourable testimonies of victory. However, a large nail, or something which struck their eyes, commonly got the better of their scruples. The king, or chief of the island, came to visit Captain Cook: he was the only one seen completely dressed in this manner. Their ordinary ornaments are necklaces, and amulets made of shells, &c. All of them had their ears pierced, though none were seen with ear-rings. The king had not much respect paid him by his attendants; he presented Captain Cook with some fruit and hogs; and acquainted him that his name was *Honoo*, and that he was *he-ka-ai*, which title seems to correspond with the *aree* of Otaheite, and *arekee* of the Friendly isles. Their dwellings are in the valleys, and on the sides of the hills near their plantations. They are built in the same manner as those at Otaheite, which will be particularly described when we speak of that island; but they are much meaner, and are only covered with the leaves of the bread-fruit tree; in general, they are built on a square or oblong pavement of stone, raised some height above the level of the ground; they likewise have such pavement near their houses, on which they sit to eat and amuse themselves. Along the uppermost edge of the mountain a row of stakes or palisadoes, closely connected together, were seen like a fortification, in which, by the help of glasses, appeared something like huts, which seemed to bear a great resemblance to the hippas of New Zealand, which will be described in speaking of that country. Their canoes resemble those of Otaheite, but not so large; their heads had commonly some flat upright piece, on which the human face was coarsely carved; and their sails were made of mats, triangular in shape, and very broad at the top: the paddles which they used were of heavy hard wood; short, but sharp-pointed, and with a knob at the upper end; they were from 10 to 22 feet long, and about 15 inches broad.

Marquesas.

Their weapons were all made of the club wood, or casnarina; and were either plain spears about 8 or 10 feet long, or clubs which commonly had a knob at one end. They have also slings with which they throw stones with great velocity, and to a great distance, but not with a good aim.

The

Marquesas. The language of these people is much nearer to that of Otaheite than any other dialect in the South sea, except that they could not pronounce the letter *r*.

The only quadrupeds seen here were hogs, except rats; here were fowls, and several small birds in the woods, whose notes were very melodious. The chief difference between the inhabitants of the Marquesas and those of the Society islands seems to consist in their different degrees of cleanliness: the former do not bathe two or three times a-day, nor wash their hands and face before and after every meal, as the latter do; and they are besides very slovenly in the manner of preparing their meals. Their diet is chiefly vegetable; though they have hogs and fowls, and catch abundance of fish at certain times. Their drink is pure water, cocoa nuts being scarce here.

It was not long before the propensity of the natives was discovered to be rather to receive than give; for when they had taken a nail as the price of a bread-fruit, the article so purchased could not be obtained from them. To remove this dishonest disposition, Captain Cook ordered a musket to be fired over their heads, which terrified them into fair dealing.

Soon after the natives had gathered courage enough to venture on board the ship, one of them unfortunately stole an iron stancheon from the gangway, with which he sprang into the sea, and, notwithstanding its weight, swam with it to his canoe, and was making to the shore with all speed. A musket was fired over his head to frighten him back, but to no effect, he still continued to make off with his booty; the whistling of another ball over his head was as ineffectual; an officer, less patient of such an injury than reason and humanity should have taught him to be, levelled a musket at the poor fellow, and shot him through the head. Captain Cook had given orders to fire *over* the canoe, but not to kill any one; he was in a boat, and came up with the canoe soon after. There were two men in her: one sat bailing out the blood and water in a kind of hysteric laugh; the other, a youth of about 14 or 15 years of age, who afterwards proved to be the son of the deceased, fixed his eyes on the dead body with a serious and dejected countenance. This act of severity, however, did not estrange the islanders to the ship, and a traffic was carried on to the satisfaction of both parties; bread-fruit, bananas, plantains, and some hogs, were given in exchange for small nails, knives, and pieces of Amsterdam cloth; red feathers of the Amsterdam island were greatly esteemed here. Captain Cook, accompanied by the gentlemen of the ship, in their walks about the country, lighted on the house which had been the habitation of the man who had been shot; there they found his son, who fled at their approach; they inquired for his female relations, and were told that they remained at the top of the mountain to weep and mourn for the dead. Notwithstanding they were then among the relations of a man who had been killed by them, not the least tokens of animosity or revenge were discernible among the natives.

The weather being extremely hot, the inhabitants made use of large fans to cool themselves, of which great numbers were purchased: the fans were formed of a kind of tough bark, or grass, very firmly and curiously plaited, and frequently whitened with shell-lime. Some had large feathered leaves of a kind of palm, which answered the purpose of an umbrella. Marquesas.

The natives at length became so familiar as to mount the sides of the ship in great numbers. They frequently danced upon the decks for the diversion of the sailors: their dances very much resembled those of Otaheite; their music too was very much the same.

A sailor having been inattentive to his duty, received several blows from Captain Cook; on seeing which, the natives exclaimed *tape-a-hei-te-tina*, "he beats his brother." From other instances that had occurred, it was clear that they knew the difference between the commander and his people, but at the same time they conceived them all brethren; and, says Mr Forster, "to me the most natural inference is, that they only applied an idea to us in this case, which really existed with regard to themselves; they probably look on themselves as one family, of which the eldest born is the chief or king."

MARQUETRY, Inlaid Work; a curious kind of work, composed of pieces of hard fine wood of different colours, fastened, in thin slices, on a ground, and sometimes enriched with other matters, as tortoise-shell, ivory, tin, and brass. Marquesas, Marquetry.

There is another kind of marquetry made, instead of wood, of glasses of various colours; and a third, where nothing but precious stones and the richest marbles are used: but these are more properly called *mosaic work*. See Mosaic.

The art of inlaying is very ancient; and is supposed to have passed from the east to the west, as one of the spoils brought to the Romans from Asia. Indeed it was then but a simple thing; nor did it arrive at any tolerable perfection till the 15th century among the Italians: it seems, however, to have arrived at its height in the 17th century among the French.

Till John of Verona, a cotemporary with Raphael, the finest works of this kind were only black and white, which are what we now call *Morescos;* but that religious, who had a genius for painting, stained his woods with dyes or boiled oils, which penetrated them. But he went no farther than the representing buildings and perspectives, which requires no great variety of colours. Those who succeeded him, not only improved on the invention of dyeing the woods, by a secret which they found of burning them without consuming, which served exceedingly well for the shadows; but had also the advantage of a number of fine new woods of naturally bright colours, by the discovery of America. With these assistances the art is now capable of imitating any thing; whence some call it the *art of painting in wood.*

The ground whereon the pieces are to be ranged and glued, is ordinarily of oak or fir well dried; and to prevent warping, is composed of several pieces glued together. The wood to be used, being reduced into leaves, of the thickness of a line, is either stained with some colour or made black for shadow; which some effect by putting it in sand, extremely heated over the fire, others by steeping it in lime-water and sublimate, and others in oil of sulphur.—Thus coloured, the contours of the piece are formed according to the parts of the design they are to represent.

This

Marquetry, Marquis.

This last is the most difficult part of marquetry, and that wherein most patience and attention are required. The two chief instruments used herein are the saw and the vice; the one to hold the matters to be formed; the other, to take off from the extremes, according to occasion. The vice is of wood, having one of its chaps fixed; the other moveable, and is opened and shut by the foot, by means of a cord fastened to a treadle. Its structure is very ingenious, yet simple enough.

The leaves to be formed (for there are frequently three or four of the same kind formed together) are put within the chaps of the vice, after being glued on the outermost part of the design whose profile they are to follow; then the workman pressing the treadle, and thus holding fast the piece, with his saw runs over all the outlines of the design.—By thus joining and forming three or four pieces together, they not only gain time, but the matter is likewise the better enabled to sustain the efforts of the saw; which, how delicate soever it may be, and how lightly soever the workman may conduct it, without such a precaution would be apt to raise splinters, to the ruin of the beauty of the work.

When the work is to consist of one single kind of wood, or of tortoise-shell, on a copper or tin ground, or *vice versa*, they only form two leaves on one another, i. e. a leaf of metal, and a leaf of wood or shell: this they call *sawing in counter parts;* for by filling the vacuities of one of the leaves by the pieces coming out of the other, the metal may serve as a ground to the wood, and the wood to the metal.

All the pieces thus formed by the saw, and marked to know them again, and the shadow given in the manner already mentioned; they veneer or fasten each in its place on the common ground; using for that purpose the best English glue.

The whole is put in a press to dry, planed over, and polished with the skin of the sea-dog, wax, and shave-grass, as in simple veneering; with this difference, however, that in marquetry the fine branches, and several of the more delicate parts of the figures, are touched up and finished with the graver.

It is the cabinetmakers, joiners, and toymen, among us, who work in marquetry; it is the enamellers and stone-cutters who deal in mosaic works: the instruments used in the former are mostly the same with those used by the ebonists.

MARQUIS, a title of honour, next in dignity to that of duke. His office is to guard the frontiers and limits of the kingdom, which were called the *marches*, from the Teutonic word *marche*, a "limit:" as, in particular, were the marches of Wales and Scotland while they continued hostile to England. The persons who had command there, were called *lords marchers*, or *marquesses;* whose authority was abolished by statute 27 Hen. VIII. c. 27. though the title had long before been made a mere design of honour. Robert Vere, earl of Oxford, being created marquis of Dublin by Richard II. in the eighth year of his reign. A marquis is created by patent; his mantle is double ermine, three doublings and a half; his title is *most honourable;* and his coronet has pearls and strawberry leaves intermixed round, of equal height.

MARR, that part of Aberdeenshire situated between the rivers Dee and Don.

Marr || Marriage.

MARRACCI, Lewis, a learned Italian, was born at Lucca in Tuscany in 1612. After having finished his juvenile studies, he entered into the congregation of regular clerks of the mother of God, and distinguished himself early by his learning and merit. He taught rhetoric seven years, and passed through several offices of his order. He applied himself principally to the study of languages, and attained of himself the knowledge of the Greek, the Hebrew, the Syriac, the Chaldee, and Arabic; which last he taught some time at Rome, by the order of Pope Alexander VII. Pope Innocent XI. chose him for his confessor, and placed great confidence in him. He would have advanced him to ecclesiastical dignities, if Marracci had not opposed him.—Marracci died at Rome in 1700, aged 87.—He was the author of several pieces in Italian; but the grand work, which has made him deservedly famous all over Europe, is his edition of the Alkoran, in the original Arabic, with a Latin version, notes, and confutation of his own. It was beautifully printed in two vols. folio at Padua in 1698. The Latin version of the Alkoran, by Marracci, with notes and observations from him and others, and a synopsis of the Mahometan religion, by way of introduction, was published by Heineccius at Leipsic, 1721, in 8vo. Marracci had also a hand in the "Biblia sacra Arabica, sacræ congregationis de propaganda fide jussu edita, ad usum ecclesiarum orientalium," *Romæ*, 1671, in 3 vols. folio.

MARRIAGE, a contract, both civil and religious, between a man and a woman, by which they engage to live together in mutual love and friendship for the ends of procreation, &c. See *Moral Philosophy*.

Marriage is part of the law of nations, and is in use among all people. The Romanists account it a sacrament.—The woman, with all her moveable goods, immediately upon marriage, passes wholly *in potestatem viri*, into the power and disposal of the husband."

The first inhabitants of Greece lived together without marriage. Cecrops, king of Athens, is said to have been the first author of this honourable institution among that people. After the commonwealths of Greece were settled, marriage was very much encouraged by their laws, and the abstaining from it was discountenanced and in many places punished. The Lacedæmonians were very remarkable for their severity towards those who deferred marriage beyond a limited time, as well as to those who wholly abstained from it. The Athenians had an express law, that all commanders, orators, and persons intrusted with any public affair, should be married men. Polygamy was not commonly tolerated in Greece. The time of marriage was not the same in all places. The Spartans were not permitted to marry till they arrived at their full strength; the reason assigned for which custom by Lycurgus was, that the Spartan children might be strong and vigorous: and the Athenian laws are said to have once ordered, that men should not marry till 35 years of age. The season of the year which they preferred for this purpose was the winter, and particularly the month of January, called *Gamelion*. The Greeks thought

Marriage. thought it scandalous to contract marriage within certain degrees of consanguinity; whilst most of the barbarous nations allowed incestuous mixtures.

Most of the Grecian states, especially such as made any figure, required their citizens should match with none but citizens, and the children were not allowed to marry without the consent of their parents. The usual ceremony in promising fidelity was kissing each other, or giving their right hands, which was a general form of ratifying all agreements. Before the marriage could be solemnized, the gods were to be consulted, and their assistance implored by prayers and sacrifices, which were offered to some of the deities that superintended these affairs, by the parents or nearest relations of the persons to be married. When the victim was opened, the gall was taken out and thrown behind the altar, as being the seat of anger and malice, and therefore the aversion of all the deities who had the care of love, as well as those who became their votaries. For the particularities relating to the bride and bridegroom, see BRIDE and BRIDEGROOM.

The Romans as well as the Greeks, disallowed of polygamy. A Roman might not marry any woman who was not a Roman. Among the Romans, the kalends, nones, and ides of every month were deemed unlucky for the celebration of marriage, as was also the feast of the *parentalia*, and the whole month of May. The most happy season in every respect was that which followed the ides of June.

The Roman laws speak of second marriages in very hard and odious terms: *Matre jam secundis nuptiis funestata*, L. iii. C. de sec. nuptiis. By these laws it was enacted, that the effects of the husband or wife deceased should pass over to the children, if the survivor should marry a second time. By the law *Hac edictali* (Cod. de sec. nupt.), the survivor, upon marrying a second time, could not give the person he married a portion more than equal to that of each of the children. In the primitive church the respect to chastity was carried so high, that a second marriage was accounted no other than a lawful whoredom, or a species of bigamy; and there are some ancient canons which forbid the ecclesiastics from being present at second marriages.

Marriage, by the Mosaic law, was subject to several restrictions: thus by Levit. chap. xviii. ver. 16. a man was forbid to marry his brother's widow unless he died without issue; in which case it became enjoined as a duty. So it was forbid to marry his wife's sister, while she was living, ver. 18.; which was not forbidden before the law, as appears from the instance of Jacob.

The ancient Roman law is silent on this head; and Papinian is the first who mentions it, on occasion of the marriage of Caracalla. The lawyers who came after him stretched the bonds of affinity so far, that they placed adoption on the same foot with nature.

Affinity, according to the modern canonists, renders marriage unlawful to the fourth generation, inclusive; but this is to be understood of direct affinity, and not of that which is secondary or collateral. *Affinis mei affinis, non est affinis meus.* It is farther to be observed, that this impediment of marriage does not only follow an affinity contracted by lawful matrimony, but also that contracted by a criminal commerce; with the difference, that this last does not extend beyond the second generation; whereas the other, as has been observed, reaches to the fourth. Marriag

In Germany they have a kind of marriage called *morganatic*, wherein a man of quality contracting with a woman of inferior rank, he gives her the left hand in lieu of the right; and stipulates in the contract that the wife shall continue in her former rank or condition; and that the children born of them shall be of the same, so that they become bastards as to matters of inheritance, though they are legitimate in effect. They cannot bear the name or arms of the family. None but princes and great lords of Germany are allowed this kind of marriage. The universities of Leipsic and Jena have declared against the validity of such contracts; maintaining that they cannot prejudice the children, especially when the emperor's consent intervenes in the marriage.

The Turks have three kinds of marriages, and three sorts of wives; *legitimate*, *wives in kebin*, and *slaves*. They marry the first, hire the second, and buy the third.

Among all the savage nations, whether in Asia, Africa, or America, the wife is commonly bought by the husband from her father or those other relations who have an authority over her; and the conclusion of a bargain for this purpose, together with the payment of the price, has therefore become the usual form or solemnity in the celebration of their marriages. The Hebrews also purchased their wives by paying down a competent dowry for them; and Aristotle makes it one argument to prove that the ancient Grecians were an uncivilized people, because they used to buy their wives; and in proportion as they laid aside their barbarous manners they left off this practice.

The English law considers marriage in no other light than as a civil contract; the holiness of the matrimonial state being left entirely to the ecclesiastical law, to which it pertains, to punish or annul incestuous or other unscriptural marriages. The law allows marriage to be good and valid, where the parties at the time of making it were willing and able to contract, and actually did contract, in the proper forms and solemnities required by law. The disabilities for contracting are of two sorts: first, such as are canonical, and therefore sufficient by the ecclesiastical laws to void the marriage in the spiritual court; such as pre-contract, consanguinity or relation by blood; and affinity, or relation by marriage, and some particular corporal infirmities. But these disabilities in our law do not make the marriage *ipso facto* void, but voidable only by sentence of separation; and marriages are esteemed valid to all civil purposes, unless such separation is actually made during the life of the parties. Thus when a man had married his first wife's sister, and after her death the bishop's court was proceeding to annul the marriage and bastardise the issue, the court of king's bench granted a prohibition *quoad hoc*; but permitted them to proceed to punish the husband for incest.

By 32 Hen. VIII. c. 38. it is declared, that all persons may lawfully marry but such as are prohibited by God's law, &c. And that nothing (God's law excepted) shall impeach any marriage but within the Levitical degrees: these are enumerated in the 18th

chapter

Marriage. chapter of Leviticus, and are illustrated by Lord Coke in this manner: a man may not marry his mother, father's sister, mother's sister, sister, daughter, daughter of his son or daughter, father's wife, uncle's wife, father's wife's daughter, brother's wife, wife's sister, son's wife, or wife's daughter, and daughter of his wife's son or daughter. And a woman may not marry her father, father's brother, mother's brother, brother, son, son of her husband's son or daughter, mother's husband, aunt's husband, sister's husband, husband's brother, and son of her husband's son or daughter. By the civil law first cousins are allowed to marry; but by the canon law both first and second cousins are prohibited. Therefore when it is vulgarly said that first cousins may marry but second cousins cannot, this probably arose by confounding these two laws; for first cousins may marry by the civil law, and second cousins cannot by the canon law. But by the foresaid stat. 32 Hen. VIII. c. 38. it is clear, that both first and second cousins may marry. By the same statute all impediments arising from precontracts to other persons were abolished, and declared of none effect unless they had been consummated with bodily knowledge; in which case the canon law holds such contract to be a marriage *de facto*. But this branch of the statute was repealed by 2 and 3 Ed. VI. c. 23. How far the act of 26 Geo. II. c. 33. (which prohibits all suits in ecclesiastical courts to compel a marriage in consequence of any contract) may collaterally extend to revive this clause of Henry VIII.'s statute, and abolish the impediment of precontract, Judge Blackstone leaves to be considered by the canonists. We shall here observe, that on a promise of marriage, if it be mutual on both sides, damages may be recovered in case either party refuses to marry; and though no time for the marriage is agreed on, if the plaintiff avers that he offered to marry the defendant who refused it, an action is maintainable for the damages; but no action shall be brought upon any agreement except it is in writing, and signed by the party to be charged. The canonical hours for celebrating marriage are from 8 to 12 in the forenoon.

The other sort of disabilities are those which are created, or at least enforced, by the municipal laws. These civil disabilities make the contract void *ab initio*, by rendering the parties incapable of forming any contract at all. The first legal disability is a prior marriage, or having another husband or wife living; in which case, besides the penalties consequent upon it as a felony, the second marriage is to all intents and purposes void. See BIGAMY and POLYGAMY.

The next legal disability is want of age: therefore if a boy under 14, or a girl under 12 years of age, marries, when either of them comes to the age of consent, they may disagree and declare the marriage void, without any divorce or sentence in the spiritual court. However, in our law it is so far a marriage, that if at the age of consent they agree to continue together, they need not be married again. Another incapacity arises from want of consent of parents or guardians. By several statutes, viz. 6 and 7 W. III. c. 6, 7, 8. W. III. c. 35. 10 Ann. c. 19. penalties of 100l. are laid on every clergyman who marries a couple either without publication of banns, which may give notice to parents or guardians, or without a license, to obtain which the consent of parents or guardians must be sworn to. And by 4 and 5 Pb. and M. c. 8. whosoever marries any woman-child under the age of 16 years, without consent of parents or guardians, shall be subject to fine or five years imprisonment; and her estate during her husband's life shall be enjoyed by the next heir. Thus also in France the sons cannot marry without consent of parents till 30 years of age, nor the daughters till 25; and in Holland the sons are at their own disposal at 25, and the daughters at 20. And by the marriage act, viz. 26 Geo. II. c. 33. it is enacted, that all marriages celebrated by license (for banns suppose notice), where either of the parties is under 21, not being a widow or widower, without the consent of the father, or if he be not living, of the mother or guardians, shall be absolutely void. However, provision is made where the mother or guardian is *non compos*, beyond sea, or unreasonably froward, to dispense with such consent at the discretion of the lord chancellor; but no provision is made in case the father should labour under any mental or other incapacity. A fourth incapacity is want of reason. It is provided by 15 Geo. II. c. 30. that the marriage of lunatics and sons under phrensies (if found lunatics under a commission or committed to the care of trustees by any act of parliament) before they are declared of sound mind by the lord chancellor or the majority of such trustees, shall be totally void. Lastly, The parties must not only be willing and able to contract, but must actually contract themselves in due form of law, to make it a good civil marriage. Any contract made *per verba de præsenti*, or in words of the present tense, and in case of cohabitation *per verba de futuro* also between persons able to contract, was before the late act deemed a valid marriage to many purposes, and the parties might be compelled in the spiritual courts to celebrate it *in facie ecclesiæ*. But these verbal contracts are now of no force to compel a future marriage. Nor is any marriage at present valid that is not celebrated in some parish church or public chapel, unless by dispensation from the archbishop of Canterbury. It must also be preceded by publication of banns or by license from the spiritual judge. A marriage in pursuance of banns must be solemnized in one of the churches or chapels where the banns were published. No parson, vicar, &c. shall be obliged to publish banns of matrimony, unless the persons to be married shall, seven days before the time required for the first publication, deliver to him a notice in writing of their true names, and of the house or houses of their respective abode within such parish, &c. and of the time that they have dwelt in such house or houses. And the said banns shall be published upon three Sundays preceding the solemnization of marriage during the time of public service: in case the parents or guardians, or either of the parties who shall be under the age of 21 years, shall openly and publicly declare, or cause to be declared, in the church or chapel where the banns shall be so published, at the time of such publication, their dissent to such marriage, such publication of banns shall be void. And when the parties dwell in divers parishes, the curate of the one parish shall not solemnize matrimony betwixt them without a certificate of the banns being thrice asked from the curate

Marriage. of the other parish. A marriage in pursuance of a license (except a special license), must be solemnized in such church or chapel where the license is granted; and no license of marriage shall be granted by any archbishop, bishop, &c. to solemnize any marriage in any other church, &c. than in the parish church, &c. within which the usual place of abode of one of the parties shall have been for four weeks immediately before the granting such license. By the same statute all marriages shall be solemnized in the presence of two credible witnesses at the least, besides the minister, who shall sign their attestation thereof; and immediately after the celebration of every marriage, an entry thereof shall be made in the parish register, expressing that the said marriage was celebrated by banns or license; and if both or either of the parties be under age, with consent of the parents or guardians, as the case shall be, signed by the minister, and also by the parties married, and attested by the two witnesses present. It is held to be also essential to a marriage, that it be performed by a person in orders; though the intervention of a priest to solemnize this contract is merely *juris positivi* and not *juris naturalis aut divini;* it being said that Pope Innocent III. was the first who ordained the celebration of marriage in the church, before which it was totally a civil contract. And in the times of the grand rebellion, all marriages were performed by the justices of the peace; and these marriages were declared valid without any fresh solemnization, by 12 Car. II. c. 33. But as the law now stands, we may upon the whole collect, that no marriage by the temporal law is *ipso facto* void, that is celebrated by a person in orders; in a parish church, a public chapel, or elsewhere, by a special dispensation; in pursuing of banns or a license; between single persons; consenting; of sound mind; and of the age of 21 years; or of the age of 14 in males and 12 in females, with consent of parents or guardians, or without it, in case of widowhood. And no marriage is voidable by the Marriage. ecclesiastical law after the death of either of the parties; nor during their lives, unless for the canonical impediments of precontract, if that indeed still exists; of consanguinity; and of affinity or corporeal imbecility subsisting previous to the marriage.

By 26 Geo. II. c. 33. the substance of which has been already recited, if any person shall solemnize matrimony in any other place than a church, &c. where banns have been usually published, unless by special license, or without publication of banns, unless license of marriage be first obtained from some person having authority to grant the same, every such person knowingly so offending shall be guilty of felony, and transported for 14 years; the prosecution to be within three years. By the same statute, to make a false entry into a marriage register; to alter it when made; to forge or counterfeit such entry, or a marriage license, or aid and abet such forgery; to utter the same as true, knowing it to be counterfeit; or to destroy or procure the destruction of any register in order to vacate any marriage, or subject any person to the penalties of this act; all these offences, knowingly and wilfully committed, subject the party to the guilt of felony without benefit of clergy. But this act doth not extend to the marriages of the royal family; nor to Scotland; nor to any marriages among the people called *Quakers*, or among persons professing the Jewish religion, where both the parties are Quakers or Jews respectively; nor to any marriages beyond the seas.

In Scotland, the parties living together as husband and wife, or declaring themselves so before witnesses, makes a valid though informal marriage. See LAW, Part III. N° 160.

For the proportions which marriages bear to births, and births to burials, in several parts of Europe, Mr Derham gives us the following table.

Names of Places.	*Marriages to Births, as*	*Births to Burials, as*
England in general - - - -	1 to 4.63	1.12 to 1
London - - - - -	1 to 4	1. to 1.1
Hantshire, from 1569 to 1658 - -	1 to 4	1.2 to 1
Tiverton in Devonshire from 1656 to 1664 -	1 to 3.7	1.26 to 1
Cranbrook in Kent, from 1560 to 1649 -	1 to 3.9	1.6 to 1
Aynho, in Northamptonshire, for 118 years -	1 to 6	1.6 to 1
Upminster in Essex, for 100 years - -	1 to 4.6	1.8 to 1
Franckfort on the Main, in 1695 - -	1 to 3.7	1.2 to 1
Old, Middle, and Lower Marck, in 1698 -	1 to 3.7	1.9 to 1
Dominions of the elector of Brandenburg, in 1698	1 to 3.7	1.5 to 1
Breslaw in Silesia, from 1687 to 1691 -	— — —	1.6 to 1
Paris, in 1670, 1671, 1672 - - -	1 to 4.7	1.6 to 1

Marriage. Marriage.

The following TABLE, *similar to the preceding, is formed from the observations collected and referred to by Dr Price.*

Names of Places.	*Marriages to Births, as*	*Births to Burials, as*
London, annual medium from 1716 to 1736 -	— — —	18,000 to 26,529, or 1 to 1.4, &c.
——— from 1759 to 1768 -	— — —	15,710 to 22,956, or 1 to 1.4, &c.
Northampton, ditto, from 1741 to 1770 - -	— — —	155 to 191, or 1 to 1.2, &c.
Norwich, ditto, from 1740 to 1769 - -	— — —	1057 to 1206, or 1 to 1.1, &c.
Shrewsbury, ditto, from 1762 to 1768 - -	— — —	301 to 329, or 1 to 1.09, &c.
Manchester and Salford, exclusive of dissenters -		
Ditto, from 1755 to 1759 - - - -	— — —	756 to 743,———
Ditto, ditto, including dissenters, from 1768 to 1772	— — —	1098 to 958, or 1.14, &c. to 1.
Gainsborough in Lincolnshire, ditto, from 1752 to 1771	1 to 3.7	126 to 105, or 1.2 to 1.
Madeira, ditto, from 1759 to 1766 - -	1 to 4.68	2201 to 1293, or 1.7 to 1.
Boston in New England, from 1731 to 1752 -	— — —	538 to 608, or 1 to 1.13, &c.
Christiana in Norway, in 1761 - - -	— — —	11,024 to 6929, or 1.5 to 1.
Paris, mean of some of the last years - -	1 to 4.3	19,100 to 19,400, or 1 to 1.01, &c.
Vienna, annual medium from 1757 to 1769 -	— — —	5800 to 6600, or 1 to 1.1, &c.
Amsterdam, ditto, for some of the last years -	1 to 1.9, &c.	4600 to 8000, or 1 to 1.1, &c.
Copenhagen, ditto - - - - -	1 to 3.04, &c.	2700 to 3300, or 1 to 1.2, &c.
Berlin, ditto, for five years, ending at 1759 -	1 to 3.94 &c.	3855 to 5054, or 1 to 1.3, &c.
Breslaw, ditto, from 1633 to 1734 - -	— — —	1089 to 1256, or 1 to 1.15, &c.
———, ditto, from 1717 to 1725 - -	— — —	1252 to 1507, or 1 to 1.2, &c.
Rome, ditto, from 1759 to 1761 - - -	— — —	5167 to 7153, or 1 to 1.3, &c.
Vaud in Switzerland, ditto, for 10 years before 1766	1 to 3.9	3155 to 2504, or 1.2, &c. to 1.

For an account of the numbers of male and female stillborn children and chrysoms, and of boys and girls under ten, of married men and married women, and of widows and widowers, who died for a course of years at Vienna, Breslaw, Dresden, Leipsic, Ratisbon, and some other towns in Germany, see Phil. Trans. Abr. vol. vii. part iv. p. 46, &c.

The reader may find many curious calculations and remarks relating to this subject in Dr Price's excellent work, entitled, Observations on Reversionary Payments. From the preceding table it appears, that marriages, one with another, do each produce about four births, both in England and other parts of Europe. Dr Price observes, that the births at Paris, as may be seen in the table, are above four times the weddings; and therefore it may seem, that in the most healthy country situations, every wedding produces above four children; and though this be the case in Paris, for reasons which he has given, he has observed nothing like it in any other great town. He adds, that from comparing the births and weddings in countries and towns where registers of them have been kept, it appears, that in the former, marriages one with another seldom produce less than four children each; generally between four and five, and sometimes above five; but in towns seldom above four, generally between three and four, and sometimes under three. It is necessary to be observed here, that though the proportion of annual births to weddings has been considered as giving the true number of children derived from each marriage, taking all marriages one with another: yet this is only true, when, for many years, the births and burials have kept nearly equal. Where there is an excess of the births occasioning an increase, the proportion of annual births to weddings must be less than the proportion of children derived from each marriage; and the contrary must take place where there is a decrease: and by Mr King's computation, about one in a hundred and four persons marry; the number of people in England being estimated at five millions and a half, whereof about forty-one thousand annually marry.

In the district of Vaud in Switzerland, the married are very nearly a third part of the inhabitants.

Major Graunt and Mr King disagree in the proportions between males and females, the latter making 10 males to 13 females in London; in other cities and towns, and in the villages and hamlets, 100 males to 99 females: but Major Graunt, both from the London and country bills, computes, that there are in England 14 males to 13 females; whence he justly infers, that the Christian religion, prohibiting polygamy, is more agreeable to the law of nature than Mahometanism and others that allow it.

This proportion of males to females Mr Derham thinks pretty just, being agreeable to what he had observed himself. In the hundred years, for instance, of his own parish register of Upminster, though the burials of males and females were nearly equal, being 633 males and 623 females in all that time; yet there were baptized 709 males and but 675 females, which is 13 females to 13.7 males.

From a register kept at Northampton for 28 years, from 1741 to 1770, it appears, that the proportion of males to females that were born in that period is 2361 to 2288, or nearly 13.4 to 13. However, though more males are born than females, Dr Price has sufficiently shown, that there is a considerable difference between the probabilities of life among males and females in favour of the latter; so that males are more shortlived

Marriage.

shortlived than females; and as the greater mortality of males takes place among children, as well as among males at all ages, the fact cannot be accounted for merely by their being more subject to untimely deaths by various accidents, and by their being addicted to the excesses and irregularities which shorten life. Mr Kersseboom informs us, that, during the course of 125 years in Holland, females have in all accidents of age lived about three or four years longer than the same number of males. In several towns of Germany, &c. it appears that of 7270 married persons who had died, the proportion of married men who died to the married women was 3 to 2; and in Breslaw for eight years, as 5 to 3. In all Pomerania, during nine years from 1748 to 1756, this proportion was nearly 15 to 11. Among the ministers and professors in Scotland, 20 married men die to 12 married women at a medium of 27 years, or in the proportion of 5 to 3; so that there is the chance of 3 to 2, and in some circumstances even a greater chance, that the woman shall be the survivor of a marriage, and not the man; and this difference cannot be accounted for merely by the difference of age between husbands and their wives, without admitting the greater mortality of males. In the district of Vaud in Switzerland, it appears, that half the females do not die till the age of 46 and upwards, though half the males die under 36. It is likewise an indisputable fact, that in the beginning of life, the rate of mortality among males is much greater than among females.

From a table formed by Dr Price, from a register kept for 20 years at Gainsborough, it appears, that of those who lived to 80, the major part, in the proportion of 49 to 32, are females. Mr Deparcieux at Paris, and Mr Wargentin in Sweden, have farther observed, that not only women live longer than men, but that married women live longer than single women. From some registers examined by Mr Muret in Switzerland, it appears, that of equal numbers of single and married women between 15 and 25, more of the former died than of the latter, in the proportion of 2 to 1.

With respect to the difference between the mortality of males and females, it is found to be much less in country parishes and villages than in towns; and hence it is inferred, that human life in males is more brittle than in females, only in consequence of adventitious causes, or of some particular debility, that takes place in polished and luxurious societies, and especially in great towns.

From the inequality above stated between the males and females that are born, it is reasonable to infer, that one man ought to have but one wife; and yet that every woman without polygamy may have a husband: this surplusage of males above females being spent in the supplies of war, the seas, &c. from which the women are exempt.

Perhaps, says Dr Price, it might have been observed with more reason, that this provision had in view that particular weakness or delicacy in the constitution of males, which makes them more subject to mortality; and which consequently renders it necessary that more of them should be produced, in order to preserve in the world a due proportion between the two sexes.

That this is a work of Providence, and not of chance, is well made out by the very laws of chance by Dr Arbuthnot; who supposes Thomas to lay against John, that for 82 years running more males shall be born than females; and giving all allowances in the computation to Thomas's side, he makes the odds against Thomas, that it does not so happen, to be near five millions of millions of millions of millions to one; but for ages of ages, according to the world's age, to be near an infinite number to one.

Marriage.

According to Mr Kersseboom's observations, there are about 325 children born from 100 marriages.

Mr Kersseboom, from his observations, estimates the duration of marriages one with another, as in the following table.

Those whose ages, taken together, make

40,	live together between	24 and 25 years.
50	22	23
60	23	21
70	19	20
80	17	18
90	14	15
100	12	13

Phil. Trans. N° 468. sect. iii. p. 319.

Dr Price has shown, that on De Moivre's hypothesis, or that the probabilities of life decrease uniformly (see *Complement of Life*,) the duration of survivorship is equal to the duration of marriage, when the ages are equal; or, in other words, that the expectation of two joint lives, the ages being equal, is the same with the expectation of of survivorship; and, consequently, the number of survivors, or (which is the same, supposing no second marriages) of widows and widowers, alive together, which will arise from any given set of such marriages constantly kept up, will be equal to the whole number of marriages, or half of them (the number of widows in particular) equal to half the number of marriages. Thus, the expectation of two joint lives, both 40, is the third of 46 years, or their complement, i. e. 15 years and 4 months; and this is also the expectation of the survivor. That is, supposing a set of marriages between persons all 40, they will one with another last just this time, and the survivors will last the same time. In adding together the years which any great number of such marriages, and their survivorships, have lasted, the sums would be found to be equal. It is observed farther, that if the number expressing the expectation of single or joint lives, multiplied by the number of single or joint lives whose expectation it is, be added annually to a society or town, the sum gives the whole number living together, to which such an annual addition would in time grow: thus, since 19, or the third of 57, is the expectation of two joint lives whose common age is 29, or common complement 57, 20 marriages every year between persons of this age would in 57 years grow to 20 times 19, or 380 marriages always existing together. The number of survivors also arising from these marriages, and always living together, would in twice 57 years increase to the same number. Moreover, the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the expectation of those lives at the time when their existence commenced. Thus, if it were found

Marriage. found that a 19th part of all the marriages among any body of men whose numbers do not vary, are dissolved every year by the death of either the husband or wife, it would appear, that 19 was at the time they were contracted, the expectation of these marriages. Dr Price observes, that the annual average of weddings among the ministers and professors in Scotland for the last 27 years has been 31; and the average of married persons for 17 years ending in 1767, had been 667. This number, divided by 31, gives $21\frac{1}{2}$, the expectation of marriage among them; which, he says, is above $2\frac{1}{2}$ years more than the expectation of marriage would be, by Dr Halley's table, on the supposition, that all first, second, and third marriages, may be justly considered as commencing one with another so early as the age of 30; and he has proved, that the expectation of two equal joint lives is to the expectation of a single life of the same age as 2 to 3: consequently, the expectation of a single life at 30, among the ministers in Scotland, cannot be less than 32.25. If we suppose the mean ages of all who marry annually to be 33 and 25, the expectation of every marriage would be 19 years; or one with another they would be all extinct in 19 years: the marriages which continue beyond this term, though fewer in number, enjoying among them just as much more duration as those that fall short of it enjoy less. But it appears from the observations and tables of Mr Muret, that, in the district of Vaud (dividing half the number of married persons, viz. 38,328, by the annual medium of weddings, viz. 808), the expectation of marriage is only $23\frac{1}{2}$ years: so much higher are the probabilities of life in the country than in towns, or, than they ought to be, according to De Moivre's hypothesis.

MARRIAGE (*Maritagium*), in *Law*, signifies not only the lawful joining of man and wife, but also the right of bestowing a ward or a widow in marriage, as well as the land given in marriage.

Dissolution of MARRIAGE. See DIVORCE.

Forcible MARRIAGE. See *FORCIBLE Marriage.*

Frank MARRIAGE. See FRANK.

Jactitation of MARRIAGE, in *Law*, is one of the first and principal matrimonial causes, when one of the parties boasts or gives out, that he or she is married to the other, whereby a common reputation of their matrimony may ensue. On this ground the party injured may libel the other in the spiritual court; and unless the defendant undertakes and makes out a proof of the actual marriage, he or she is enjoined perpetual silence on that head; which is the only remedy the ecclesiastical courts can give for this injury.

Marriage Settlement is a legal act, previous to marriage, whereby a jointure is secured to the wife after the death of the husband. These settlements seem to have been in use among the ancient Germans, and their kindred nation the Gauls. Of the former Tacitus give us this account: *Dotem non uxor marito, sed uxori maritus affert: intersunt parentes et propinqui, et munera probant* (De Mor. Germ. c. 18.) And Cæsar (De Bell. Gallic. lib. vi. c. 18.) has given us the terms of a marriage settlement among the Gauls, as nicely calculated as any modern jointure: *Viri, quantas pecunias ab uxoribus dotis nomine acceperunt, tantas ex suis bonis, æstimatione facta, cum dotibus communicant. Hujus omnis pecuniæ conjunctim ratio habetur, fructusque servatur. Uter eorum vita superavit, ad eum pars utriusque cum fructibus superiorum temporum pervenit.* The dauphin's commentator supposes that this Gaulish custom was the ground of the new regulations made by Justinian, Nov. 97. with regard to the provision for widows among the Romans; but surely there is as much reason to suppose, says Judge Blackstone, that it gave the hint for our statutable jointures. Comment. vol. ii. p. 138. Marriage || Mars.

See an excellent marriage settlement by Blackstone in the appendix to the second volume of his Commentaries.

Duty of MARRIAGE, is a term used in some ancient customs, signifying an obligation on women to marry. To understand this, it must be observed, that old maids and widows about sixty, who held fees in body, or were charged with any personal or military services, were anciently obliged to marry, to render those services to the lord by their husbands, or to indemnify the lord for what they could not do in person. And this was called *duty* or *service of marriage.*

Policy of encouraging MARRIAGE.—Till the principles of population were explained by Malthus, it was generally held to be the interest of governments to encourage marriage, and to discourage celibacy. Dr Halley has enlarged on this subject, and has shown by computation, that were it not for the backwardness of people to marry, from the prospect of the necessary trouble and charge in providing for a family, there might be four times as many births as there are. It has been a favourite object, too, with most of the governments of Europe at one time or another, to encourage marriage with the view of increasing the population. But we know now that all such attempts are not merely idle, but mischievous. The motives that lead men to marry are at all times sufficiently powerful, and the most common error of individuals has been, not in resisting, but in yielding to these motives, without a due regard to prudence. Population, so far from requiring any artificial stimulus, has a constant tendency to exceed the means of subsistence; and it is only kept down to the proper level, partly by the prudence of those who live in celibacy, and partly by the pressure of misery from the want or the insufficiency of food. To increase the number of marriages, therefore, without regard to the ability of the parents to bring up their offspring, would have the effect of bringing human beings into the world to be destroyed by want or disease.

MARROW, in *Anatomy*, a soft oleaginous substance contained in the cavity of the bones. See ANATOMY, N° 5.

MARRUBIUM, WHITE HOREHOUND; a genus of plants belonging to the didynamia class; and in the natural method ranking under the 42d order, *Verticillatæ*. See BOTANY *Index*.

MARS, in *Astronomy*, one of the eleven planets, situated without the earth's orbit, and remarkable for the extent of its atmosphere and the redness of its light. See ASTRONOMY *Index*.

The red colour of this planet, according to Dr Brewster *, is owing to the same cause as the redness of the morning and evening clouds. When a beam of white light passes through any medium, its colour inclines

* *Supplementary Chapters to Ferguson's Astronomy*, vol. ii.

Mars, Marsais.

clines to red, in proportion to the space through which it has travelled, and the density of the medium. The momentum of the red or least refrangible rays being greater than that of the violet or most refrangible rays, the former will make their way through the resisting medium, while the latter are either reflected or absorbed. The colour of the beam, therefore, when it reaches the eye, must partake of the colour of the least refrangible ray; and the redness of this colour must increase with the number of the violet rays that have been obstructed. Hence we see, that the sun, moon, and stars appear red, when in the horizon; and that every luminous object seen through a mist is of a ruddy hue. Now, the planet Mars is allowed to have an atmosphere of great density and extent, as is manifest from the dim appearance of the fixed stars that are placed at a considerable distance from his disk. The sun's light, therefore, by which this planet is illuminated, having to pass twice through the atmosphere of Mars before it reaches the earth, must be deprived of a great proportion of the violet rays; and consequently the colour of the resulting light by which Mars is visible, must be red.—As there is a considerable difference of colour among the other planets, and likewise among the fixed stars, are we not entitled to conclude, that those in which the red colour predominates, have the greatest or the densest atmospheres? According to this principle, Saturn must have the next greatest atmosphere to that of Mars.

MARS, in Pagan worship, the god of war. He was, according to some, the son of Jupiter and Juno; while others say that he was the son of Juno alone, who being displeased at Jupiter's having produced Minerva from his brain, without female aid, in revenge conceived without the assistance of the other sex, by touching a flower shown to her by Flora in the plains of Olénus, and became the mother of this formidable deity. The amours of Mars and Venus, and the manner in which Vulcan caught and exposed them to the laughter of the other gods, have been described by several of the ancient poets. He is represented as having several wives and mistresses, and a considerable number of children. He was held in the highest veneration by the Romans, both from his being the father of Romulus their founder, and from their inclination to conquest; and had magnificent temples erected to him at Rome.

Mars is usually represented in a chariot, drawn by furious horses. He is completely armed; and extends his spear with the one hand, and grasps a sword, imbrued in blood, with the other. He has a fierce and savage aspect. Discord is represented preceding his car; and Clamour, Fear, and Terror, appear in his train. The victims sacrificed to him were the wolf, the horse, the woodpecker, the vulture, and the cock.

MARS, among the older chemists, denotes *iron*; that metal being supposed to be under the influence of the planet Mars.

MARSAIS, CESAR CHESNEAU DU, an eminent literary character, was born at Marseilles 1676. He attached himself at an early period of life to the order of the congregation of the oratory; but the situation was too narrow for his genius, and he soon left it. At Paris he married, became advocate, and entered on this new profession with great success and approbation. Disappointed, however, in his expectations of making a speedy fortune, he abandoned the law also. About this time the peevish humour of his wife occasioned a separation. We next find him as governor to the son of the president de Maisons; and when the premature death of the father deprived him of the fruits of his industry, he engaged with the famous Law in the same capacity. After the fall of this extraordinary projector, he completed the education of the marquis de Beaufremont's children, and reared pupils worthy of his genius and industry. Although he was accused of a tendency to Deism, and though there was good reason for the accusation, yet he never infused into the minds of his scholars any principle inconsistent with sound morality, or with the Christian religion. When he left M. de Beaufremont's family, he took a boarding house, in which, after a method of his own, he educated a certain number of young men. Unexpected circumstances obliged him to abandon this useful undertaking. He was even constrained to give some occasional lessons for the bare necessaries of life. Without fortune, without hope, and almost without resource, he was reduced to extreme indigence. In this situation he was found by the authors of the *Encyclopédie*, and made a partner in conducting that great work. Among many other excellent pieces, the article *Grammar* breathes the spirit of sound philosophy. His principles are clear and solid. He discovers an extreme knowledge of the subject, great accuracy in the rules, and great propriety in the application. M. le Comte de Lauraguais was so much affected with the distresses, and so much convinced of the merit of *Du Marsais*, that he procured him a pension of 1000 livres. Du Marsais died at Paris on the 11th of June 1756, in his eightieth year, after having received the sacrament. The compliment which he paid to the priest on this occasion has been considered by some as rather equivocal. But there is no necessity to deprive religion of this triumph, or philosophy of that honour which conviction and penitence must confer on it. "The faith of a great genius (says Bayle, who is entitled to credit on this subject), is not totally extinguished: It is like a spark under the ashes. Reflection and the prospect of danger call forth its exertions. There are certain situations in which philosophers are as full of anxiety and remorse as other men." Whatever were the last sentiments of Du Marsais, it cannot be denied that in the vigour of health he furnished several examples of irreligion, and to these have been added many absurd stories. The superiority of Du Marsais's talents consisted in exactness and perspicuity. His ignorance of the world, and of the customs of mankind, together with the greatest latitude in expressing whatever he thought, gave him that frank and unguarded simplicity which is often the chief ingredient of genuine humour. Fontenelle used to say of him, "that he was the most lively simpleton, and as a man of wit the most simple he ever knew." He was the Fontaine of philosophers. In consequence of this character, he was a nice judge of what was natural in every production, and a great enemy to all kind of affectation. His principal works are, 1. *Exposition de la doctrine de l'Eglise Gallicane par rapport aux pretensions de la Cour de Rome*, 12mo. This accurate work was begun at the desire of the president

Marsais.

Marsais || Marseilles.

sident de Maisons, and did not appear till after the death of the author. 2. *Exposition d'une methode raisonée pour apprendre la langue Latine*, 12mo, 1722, rare. This method appears conformable to the natural unfolding of the powers of the mind, and on that account renders the acquisition of the language less difficult; but it was liable to two great objections to vulgar and unenlightened understandings, namely, its novelty, and the censure which it conveyed against the former method. 3. *Traité des tropes*, 1730, 8vo; again printed in 1771, 12mo. This work is intended to explain the different significations of the same word. It is a masterpiece of logic, of accuracy, of perspicuity, and precision. The observations and the rules are illustrated by striking examples calculated to show both the use and the abuse of the rhetorical figures. It is wonderful at the same time that this excellent book had very little sale, and is scarcely known. A gentleman who wanted to compliment the author on this extraordinary performance, told him that he had heard a great deal of his *Histoire des Tropes*, and begged to know in what particular part of the world the nation flourished. 4. *Les veritable Principes de la Grammaire raisonée pour apprendre la langue Latine*, 1729, 4to. There was only the preface of this work published, in which he introduced the greatest part of his *methode raisonée*. 5. *Labiege de la fable du Pere Jouvenci*, arranged after the manner of the original plan, 1731, 12mo. 6. *Une reponse manuscrite à la Critique de l'Histoire des Oracles par le Pere Baltus.* There are only imperfect fragments of these papers to be found. 7. *Logique, ou reflections sur les operations de l'Esprit.* This is a short tract, which nevertheless contains every thing necessary to be known in the art of reasoning. It was reprinted at Paris in two parts, together with the articles which he had furnished for the *Encyclopédie*, 1762.

MARSAL, a town of France, in Lorrain, remarkable for its salt works; seated in a marsh on the river Selle, of difficult access, which, together with the fortifications, render it an important place. E. Long. 6. 43. N. Lat. 48. 46.

MARSALA, an ancient and strong town of Sicily, in the valley of Mazara. It is well peopled, and built on the ruins of the ancient Lilybœum. E. Long. 12. 27. N. Lat. 37. 52.

MARSAN, or MOUNT MARSAN, a town of France, in Gascony, and capital of a small territory of the same name, fertile in wine; seated on the river Miduse, in W. Long. 0. 39. N. Lat. 44. 0.

MARSAQUIVER, or MARSALQUIVER, a strong and ancient town of Africa, on the coast of Barbary, and in the province of Beni Arax, in the kingdom of Tremesen, with one of the best harbours in Africa. It was taken by the Spaniards in 1732. It is seated on a rock near a bay of the sea, in W. Long. 0. 10. N. Lat. 35. 40.

MARSEILLES, a strong sea port, and the richest town of Provence, in France. Here is a good harbour, where the French galleys are stationed; for it will not admit large men of war. Before the revolution 4500 vessels entered the harbour every year. The entrance, which is extremely narrow and surrounded by lofty mountains, protects and shelters vessels during the most violent storms. The port itself forms a delightful walk, even in the middle of winter, as it is open to the southern sun, and crowded with vast numbers of people, not only of all the European nations, but of Turks, Greeks, and natives of the coast of Barbary. The whole scene is one of the most agreeable that can be imagined, if the chains of the galley slaves heard among the hum of business did not tincture it with the hateful idea of slavery. The galleys themselves rot in their respective stations: and it is said that no others will ever be constructed to supply their place, as they have long ceased to be of any utility to the state. Marseilles pretends to the most remote antiquity; a colony of Phocians, in ages unknown, having given it birth. It is divided into the Old Town and the New; which are separated by a street, bordered with trees on each side. The Old Town is one of the worst built of any in Europe. The New has sprung up since the commencement of the 18th century, and has all that regularity, elegance, and convenience, which distinguish the present times. It is said to contain 100,000 inhabitants, and is one of the most trading towns in France. Without the walls is the castle of Notre-Dame, which is very well fortified. It is a bishop's see, and there is a French academy; it having been noted at all times for men of learning. There is also a cabinet of natural history. In 1660, Louis XIV. built the citadel and Fort St John to keep the inhabitants in awe, because they pretended to be free. The Jesuits had a very fine observatory here; and in the arsenal, built not long ago, there are arms for 40,000 men. In the House of Discipline they weave gold, silver, and silk brocades. The drugs are brought thither from all parts of the world. It is seated on the north shore of the Mediterranean, in E. Long. 5. 22. N. Lat. 43. 18. The surrounding country is rocky and barren, but covered for several miles on all sides with villas and summer houses, which commerce has erected.

Marseilles || Marshal.

MARSH, NARCISSUS, a learned Irish prelate, was born at Hannington in Wiltshire in 1638. He was made principal of St Alban's hall, Oxford, in 1673, but removed to the provostship of Dublin college in 1678, promoted to the bishopric of Leighlin and Ferns in 1682, translated to the archbishopric of Cashel in 1690, to Dublin in 1694, and to Armagh in 1703. While he held the see of Dublin, he built a noble library for the use of the public, filled it with choice books, and settled a provision for two librarians. He repaired, at his own expence, several decayed churches, besides buying in and restoring many impropriations, and presenting a great number of oriental MSS. to the Bodleian library. He was a very learned and accomplished man; was well versed in sacred and profane literature, in mathematics, natural philosophy, the learned languages, especially the oriental, and in both the theory and practice of music. He published, 1. *Institutiones logicæ. Manuductio ad logicam*, written by Philip de Trieu; to which he added the Greek text of Aristotle and some tables and schemes. 3. An introductory essay on the doctrine of sounds, &c. He died in 1713.

MARSH, signifies a piece of ground flowed with water, yet so that the grass and other vegetables rise above the surface of the water, and, by their decaying, give rise to putrid effluvia, which are very pernicious to the human body.

MARSHAL, or MARESCHAL, (*marescallus*), primarily

Marshal. marily denotes an officer who has the care or the command of horses. Nicod derives the word from *polemarchus*, "master of the camp;" Matthew Paris from *Martis senescallus*. In the old Gaulish language, *march* signified "horse;" whence *mareschal* might signify "him who commanded the cavalry." Other derivations have been given by different authors; and the name itself has been applied to officers of very different employments.

Marshal of France, the highest dignity of preferment in the French armies under the old government. The dignity of marshal came to be for life, though at its first institution it was otherwise. They were then only the king's first ecuyers under the constable; but in time they became the constable's lieutenants in the command of the army, the constable himself being then become captain general. At first they were but two in number; and their allowance was but 500 livres per annum in time of war, and nothing in time of peace; but in the reign of Francis I. a third was added; Henry II. created a fourth. Since it has been various; Louis XIV. increased it to 20. Their office at first was, to marshal the army under the constable, and to command in his absence. They did then what the *marshals de camp* do now; to which last they have given their title, and the least considerable part of their authority.

Earl Marshal of Scotland. His office was to command the cavalry, whereas the CONSTABLE commanded the whole army. They seem, however, to have had a sort of joint command, as of old all orders were addressed "to our constable and marischal." The office of earl marischal has never been out of the noble family of Keith. It was reserved at the Union; and when the heritable jurisdictions were bought, it was in the crown, being forfeited by the rebellion of Geo. Keith, earl marischal, in 1715.

Earl Marshal of England, is the eighth great officer of state. This office, until it was made hereditary, always passed by grant from the king, and never was held by tenure or sergeantry (by any subject), as the offices of lord high steward and lord high constable were sometimes held. The title is personal, the office honorary and officiary. They were formerly styled *lord marshal* only, until King Richard II. June 20. 1397, granted letters patent to Thomas Mowbray, earl of Nottingham, and to the heirs male of his body lawfully begotten, by the name and style of *earl marshal*; and further, gave them power to bear in their hand a gold truncheon, enamelled with black at each end; having at the upper end of it the king's arms engraven thereon, and at the lower end his own arms.

King James I. was pleased, by letters patent, dated August 29th 1622, to constitute Thomas Howard, earl of Arundel and Surrey, earl marshal for life; and the next year, the same king granted (with the advice of the privy-council) letters patent, wherein it was declared, that during the vacancy of the office of lord high constable of England, the earl marshal had the like jurisdiction in the court of chivalry, as both constable and marshal jointly ever exercised. See *Chivalry, Court of.*

On the 19th of October 1672, King Charles II. was pleased to grant to Henry Lord Howard, and the heirs male of his body lawfully begotten, the office and dignity of earl marshal of England, with power to execute the same by deputy or deputies, in as full and ample a manner as the same was heretofore executed by Henry Howard, Lord Maltravers, late earl of Arundel, Surrey, and Norfolk, grandfather to the said Henry Lord Howard; or by Thomas Howard late duke of Norfolk, grandfather to the said Thomas Howard, late earl of Arundel, Surrey, and Norfolk; or by Thomas Howard duke of Norfolk, grandfather of the said Thomas Howard duke of Norfolk; or by John Mowbray duke of Norfolk, or any other earl marshal of England; with a pension of 20l. each year, payable out of the hanaper office in chancery; and on default of the issue-male of the said Henry Lord Howard, with limitation to the heirs male lawfully begotten of the body of the said Thomas Howard earl of Arundel, &c.; and, on the default of such issue male, to descend in like manner to the heirs male of Thomas late earl of Suffolk; and, on default of his issue male, to the heirs male of Lord William Howard, late of Naworth in the county of Cumberland, youngest son to Henry Howard late duke of Norfolk; and, on default of his issue-male, to Charles Howard earl of Nottingham, and the heirs male of his body lawfully begotten, Marshal || Marshalsea.

Field-Marshal, an officer of high rank in the European armies. It is now, however, disused in the British army; Lord Tyrawley was the last, appointed in 1763.

Knight-Marshal, or *Marshal of the King's House*, an English officer, whose business, according to Fleta, is to execute the commands and decrees of the lord steward, and to have the custody of prisoners committed by the court of verge. Under him are six marshals men, who are properly the king's bailiffs, and arrest in the verge of the court, when a warrant is backed by the board of green-cloth. The court where causes of this kind, between man and man, are tried, is called the *Marshalsea*, and is under the knight-marshal. See MARSHALSEA.

This is also the name of the prison in Southwark; the reason of which may probably be, that the marshal of the king's house was wont to sit there in judgment, or keep his prison.

Marshal of the King's Bench, an officer who has custody of the prison called the *King's Bench* in Southwark. He gives attendance upon the court, and takes into his custody all prisoners committed by the court; he is finable for his absence, and non-attendance incurs a forfeiture of his office. The power of appointing the marshal of the king's bench is in the crown.

In Fleta, mention is also made of a *marshal of the exchequer*, to whom the court commits the custody of the king's debtors, &c.

MARSHALLING *a* COAT, in *Heraldry*, is the disposal of several coats of arms belonging to distinct families in one and the same escutcheon or shield, together with their ornaments, parts, and appurtenances. See HERALDRY, chap. vi. p. 466.

MARSHALSEA, *the Court of*, and the *Palace Court* at Westminster, though two distinct courts, are frequently confounded together. The former was originally holden before the steward and marshal of the king's

Marshalsea ‖ Marshland.

king's house, and was instituted to administer justice between the king's domestic servants, that they might not be drawn into other courts, and thereby the king lose their service. It was formerly held in, though not a part of, the *aula regis;* and, when that was subdivided, remained a distinct jurisdiction: holding plea of all trespasses committed within the verge of the court, where only one of the parties is in the king's domestic service (in which case the inquest shall be taken by a jury of the country); and of all debts, contracts, and covenants, where both of the contracting parties belong to the royal household; and then the inquest shall be composed of men of the household only. By the statute of 13 Rich. II. stat. 1. c. 3. (in affirmance of the common law), the verge of the court in this respect extends for 12 miles round the king's place of residence. And, as this tribunal was never subject to the jurisdiction of the chief justiciary, no writ of error lay from it (though a court of record) to the king's bench, but only to parliament, till the statutes of 5 Edw. III. c. 2. and 10 Edw. III. stat. 2. c. 3. which allowed such writ of error before the king in his place. But this court being ambulatory, and obliged to follow the king in all his progresses, so that by the removal of the household actions were frequently discontinued, and doubts having arisen as to the extent of its jurisdiction, King Charles I. in the sixth year of his reign, by his letters patent, erected a new court of record, called the *curia palatii*, or *palace court*, to be held before the steward of the household and knight-marshal, and the steward of the court, or his deputy; with jurisdiction to hold plea of all manner of personal actions whatsoever, which shall arise between any parties within 12 miles of his majesty's palace at Whitehall. The court is now held once a week, together with the ancient court of marshalsea, in the borough of Southwark: and a writ of error lies from thence to the court of king's bench. But if the cause is of any considerable consequence, it is usually removed on its first commencement, together with the custody of the defendant, either into the king's bench or common pleas, by a writ of *habeas corpus cum causa:* and the inferior business of the court hath of late years been much reduced, by the new courts of conscience erected in the environs of London; in consideration of which the four counsel belonging to these courts had salaries granted them for their lives by the stat. 23 Geo. II. c. 27.

MARSHFIELD, a town of Gloucestershire, seven miles from Bath, and 104 from London, on the road to Bristol, and on the very borders of Wilts. It is a considerable clothing town, derives a good trade in malt, and is famous for cakes. It consists chiefly of one street of old buildings near a mile long; and is governed by a bailiff. The number of inhabitants in 1801 amounted to 1246. It has a large church, with a well endowed alms house, and a charity school; and it has a weekly market and two fairs.

MARSHLAND, a marshy peninsula in the county of Norfolk, opposite to King's Lynn, almost surrounded with the Ouse and other navigable rivers, and an arm of the sea. It seems formerly to have been recovered out of the ocean, from whose inundations it could never be altogether defended; and in Sir Henry Spelman's time it suffered two general ones, viz. one from the salt water, the other from the freshes; by the last of which the inhabitants suffered 42,000l. damage. It contains about 30,000 acres, which turn to more profit by grazing than ploughing. It is about 10 miles in the widest place, and has no less than 111 brick bridges. The commonage of it belongs to seven villages that surround it. The air is so unhealthy, that an ague is commonly called *the Marshland bailiff.*

Marshland ‖ Marsigli.

MARSHMALLOW. See ALTHEA, BOTANY *Index.*

MARSI, a nation of Germany, who afterwards came to settle in Italy, where they occupied the territory in the environs of the Fucine lake. They at first proved very inimical to Rome, but in process of time they became its firmest supporters. They were allowed by the Romans to be the most intrepid soldiers of their legions when in friendship, and the most formidable of their enemies when at variance; and it was a common saying, that Rome could neither triumph over the Marsi nor without them. They are particularly celebrated for the civil war in which they were engaged, and which from them has received the name of the *Marsian war.* The large contributions they made to support the interest of Rome, and the number of men which they continually supplied to the republic, rendered them bold and aspiring; and they claimed, with the rest of the Italian states, a share of the honour and privileges which were enjoyed by the citizens of Rome. This petition, though supported by the interest, the eloquence, and the integrity of the tribune Drusus, was received with contempt by the Roman senate; upon which, in the 662d year of Rome, the Marsi put themselves at the head of the Social war, one of the most obstinate and dangerous oppositions ever made to the progress of the Roman power. They obtained several victories: but they were at last defeated; though the war was not terminated but by a grant of those privileges for which they contended.

MARSICO NUOVO, a small, rich, and handsome town of Italy, in the kingdom of Naples, and in the Hither Principato, with a bishop's see. It is seated at the foot of the Apennines, near the river Agri, in E. Long. 15. 49. N. Lat. 20. 42.

MARSIGLI, LEWIS FERDINAND, COUNT, an Italian, famous for letters as well as arms, was descended from an ancient and noble family, and born at Bologna in 1658. He acquired a great knowledge in the art of war and fortification; served under the emperor Leopold II. against the Turks, by whom he was taken prisoner in 1683, but redeemed, after a year's captivity. In the Spanish succession war, Marsigli, then advanced to the rank of marshal, being in the fortress of Brisac, which surrendered to the duke of Burgundy in 1703, when the place was deemed capable of holding out much longer, was stripped of all his commissions, and had his sword broke over him; and the count d'Arco who commanded was beheaded. Marsigli now sought for consolation in the sciences; as, amidst all the hurry and fatigue of war, he had made all the advantages the most philosophic man could do, who had travelled purely in quest of knowledge. He had a rich collection of every thing proper to the advancement of natural knowledge, instruments astronomical and chemical, plans of fortifications, models of

Marsigli || Mart.

machines, &c. all which he presented to the senate of Bologna by an authentic act in 1712, forming at the same time out of them what he called *the Institute of the arts and sciences at Bologna*. He also founded a printing house, and furnished it with the best types for Latin, Greek, Hebrew, and Arabic, which he presented in 1728 to the Dominicans at Bologna, on condition of their printing all the writings of the *Institute* at prime cost: this was called the *printing house of St Thomas Aquinas*. His writings on philosophical subjects are numerous and valuable, in Latin, Italian, and French. He died in 1730.

MARSTON, JOHN, an English dramatic writer, who lived in the time of James I. Wood says he was a student in Corpus Christi college, Oxford; but neither his family nor the time of his birth is known. He produced eight plays for the stage, which were all acted at Blackfriars with applause: and one of them, called the *Dutch Courtezan*, was once revived since the Restoration, under the title of the *Revenge*, or a *Match in Newgate*. There is no account when he died; but we find his works were published after his death by Shakespeare, and may thence reasonably conclude that it happened about the year 1614. He was a chaste and pure writer; avoiding all that obscenity, ribaldry, and scurrility, which too many of the playwrights of that time, and indeed much more so in some periods since, have made the basis of their wit, to the great disgrace and scandal of the stage.

MARSYAS, in fabulous history, a celebrated musician of Celænæ, in Phrygia, son of Olympus, or of Hyagnis, or Oeagrus. He was so skilful in playing on the flute, that he is generally deemed the inventor of it. According to the opinion of some, he found it when Minerva had thrown it aside on account of the distortion of her face when she played upon it. Marsyas was enamoured of Cybele, and he travelled with her as far as Nysa, where he had the imprudence to challenge Apollo to a trial of his skill as a musician. The god accepted the challenge, and it was mutually agreed that he who was defeated should be flayed alive by the conqueror. The Muses, or (according to Diodorus) the inhabitants of Nysa, were appointed umpires. Each exerted his utmost skill, and the victory, with much difficulty, was adjudged to Apollo. The god upon this tied his antagonist to a tree, and flayed him alive: (See APOLLO). The death of Marsyas was universally lamented; the Fauns, Satyrs, and Dryads, wept at his fate; and from their abundant tears arose a river of Phrygia, well known by the name of *Marsyas*. The unfortunate Marsyas is often represented on monuments, as tied with his hands behind his back to a tree, while Apollo stands before him with his lyre in his hands. In independent cities, among the ancients, the statue of Marsyas was generally erected in the forum, to represent the intimacy which subsisted between Bacchus and Marsyas as the emblems of liberty. At Celænæ, the skin of Marsyas was shown to travellers for some time. It was suspended in the public place, in the form of a bladder or a foot ball.

The sources of the Marsyas were near those of the Mæander, and those two rivers had their confluence a little below the town of Celænæ.

MART, a great fair held every year for buying and selling goods. Public marts, or places of buying and selling, such as markets and fairs, with the tolls thereunto belonging, can only be set up by virtue of the king's grant, or by long and immemorial usage and prescription, which presupposes such a grant. The limitation of these public resorts, to such time and place as may be most convenient for the neighbourhood, forms a part of economics, or domestic polity; which, considering the kingdom as a large family, and the king as the master of it, he has clearly a right to dispose and order as he pleases.

Mart || Martial Law.

MARTABAN, a province of Asia, in the kingdom of Pegu, lying on the gulf of Bengal. It is a country that produces rice and all kinds of fruits proper to the climate. It has mines of several sorts of metals, and carries on a great trade. The chief town, which is of the same name, is rich, handsome, and very populous, with a good harbour. E. Long. 97. 50. N. Lat. 15. 35.

MARTEAU, the name given by French naturalists to a peculiar species of oysters, called also *malleus* by others, the figure of which is that of a hammer, or rather of a pickaxe. See OSTREA, CONCHOLOGY *Index*.

MARTHA, ST, a province, of South America, on the coast of Terra Firma, bounded on the north by the North sea, on the east by Rio de la Hache, on the south by New Granada, and on the west by Carthagena. It is 300 miles in length and 200 in breadth, is a mountainous country, and the land very high. Here begins the famous ridge of mountains called the *Cordilleras des los Andes*, which run from north to south the whole length of the continent of South America. It is extremely hot on the sea coast; but cold in the internal parts, on account of the mountains. It abounds with the fruits proper to the climate; and there are mines of gold and precious stones, as also salt works. The Spaniards possess but one part of this province, in which they have built St Martha the capital. The air about the town is wholesome; and it is seated near the sea, having a harbour surrounded with high mountains. It was formerly very considerable when the galleons were sent thither, but is now come almost to nothing. W. Long. 74. 11. N. Lat. 11. 20.

MARTHA's Vineyard, an island of North America, near the coast of New England, 80 miles south of Boston. It is sixteen miles in length and eight in breadth, and has a light soil, which in some places is fertile. In conjunction with neighbouring islands of smaller size, it forms Duke's county, containing about 3290 inhabitants. The climate is temperate and healthy; the winter is generally mild, and in summer the temperature seldom exceeds 80 of Fahrenheit. The inhabitants apply themselves chiefly to the fisheries, in which they have great success. W. Lon. 70. 35. N. Lat. 41. 0.

MARTIAL, is sometimes used to express preparations of iron, or such as are impregnated therewith; as the martial regulus of antimony, &c.

MARTIAL Court. See *COURT Martial*.

MARTIAL Law, is the law of war that depends upthe just but arbitrary will and pleasure of the king, or his lieutenant: for though the king doth not make any laws but by common consent in parliament, yet, in time of war, by reason of the necessity of it to guard against

Martial Law || Martin.

against dangers that often arise, he useth absolute power, so that his word is a law. *Smith de Repub. Ang.* lib. ii. c. 4.

But the martial law (according to Chief Justice Hale), is in reality not a law, but something indulged rather than allowed as a law; and it relates only to members of the army, being never intended to be executed on others, who ought to be ordered and governed by the laws to which they are subject, though it be a time of war. And the exercise of martial law, whereby any person might lose his life, or member, or liberty, may not be permitted in time of peace, when the king's courts are open for all persons to receive justice.

MARTIALIS, MARCUS VALERIUS, a famous Latin poet, born at Bilbilis, now called *Bubiera*, in the kingdom of Arragon in Spain, was of the order of knights. He went to Rome at the age of 21, and staid there 35 years, under the reign of Galba and the succeeding emperors, till that of Trajan; and having acquired the esteem of Titus and Domitian, he was created tribune. At length, finding that he was neglected by Trajan, he returned to his own country Bilbilis, where he married a wife, and had the happiness to live with her several years. He admires and commends her much, telling her that she alone was sufficient to supply the want of every thing he enjoyed at Rome. "*Romam tu mihi sola facis*," says he, in the 21st epigram of the 12th book. She appears likewise to have been a lady of a very large fortune; for, in the 31st epigram of the same book, he extols the magnificence of the house and gardens he had received from her, and says that she had made him a little kind of monarch.

Munera sunt domino: post septima lustra reverso,
Has Marcella domos, parvaque regna dedit.

There are still extant 14 books of his epigrams, filled with points, a play upon words, and obscenities. The style is affected. However, some of his epigrams are excellent; many of them are of the middling kind; but the greatest part of them are bad: so that Martial never spoke a greater truth, than when he said of his own works,

Sunt bona, sunt quædam mediocria, sunt mala plura.

There is also attributed to him a book on the spectacles of the amphitheatre; but the most learned critics think that this last work was not written by Martial. The best editions of Martial are, that *in Usum Delphini*, 4to, Paris, 1617, and that *cum Notis Variorum*.

MARTIGUES, a sea-port town of France, in Provence, with the title of a principality; seated near a lake 12 miles long and five broad, which is navigable throughout, and from whence they get excellent salt. E. Long. 4. 20. N. Lat. 43. 38.

MARTIN ST, was born at Sabaria in Pannonia, (at present *Stain* in Lower Hungary), in the beginning of the fourth century. His father was a military tribune; and he himself was obliged to carry arms, although peace and solitude were much more agreeable to his inclination. He was remarkable for every virtue, in a profession which is generally considered to give a sanction to vice. He divided his coat with a naked wretch whom he met at the gate of Amiens; and it is reported, that Jesus Christ appeared to him on the night following, clothed in this half of his coat. Martin was then a catechumen; but he soon afterwards received baptism, and renounced the military profession for the ecclesiastical. After passing many years in solitude, St Hilary bishop of Poictiers gave him the power to cast out devils. On his return to Pannonia, he persuaded his mother to embrace Christianity; and with great zeal and activity opposed the Arians, who governed the church in Illyria. When he was publicly whipt for giving testimony to the divinity of Christ, he bore the punishment with the constancy and patience of the first martyrs. This illustrious champion for Christianity, when he heard that St Hilary was returned from banishment, went and settled in the neighbourhood of Poictiers. In this retirement, a great number of monks placed themselves under his direction. His virtues became every day more splendid and remarkable, till he was drawn from his solitude, and with the general approbation of the clergy and people elected bishop of Tours in the year 374. To the zeal and charity of a bishop, he joined the humility and poverty of an anchorite. That he might detach himself more from the world, he built the celebrated monastery of Marmoutier, which still remains, and which is believed to be the oldest abbey in France. It is situated near the city of Tours, betwixt the Loire and a steep rock. In this situation, together with 80 monks, St Martin displayed the most exemplary sanctity and mortification; nor were there any monks better disciplined than those of Marmoutier. After he had converted his diocese to the Christian faith, he became the apostle of all Gaul. He diffused the doctrines of Christianity among the heathens, destroyed their temples, and (according to the writers of his life), confirmed the truth by an infinite number of miracles. The emperor Valentinian, at that time in Gaul, received him with every mark of respect and honour. The tyrant Maximus, who had revolted against the emperor Gratian, and seized on Spain, England, and Gaul, received him in a manner no less distinguished. The holy bishop attended him at Treves in the year 383, to solicit some favours. Maximus made him sit at his table with the most illustrious persons of his court, and placed him at his right hand. In drinking, the usurper commanded his servants to give him a cup, that he might again receive it from him; but this extraordinary prelate gave it to the priest who accompanied him on his journey. This holy boldness, far from displeasing them, gained him the favour of the emperor and of his court. Martin, who was an enemy to heresy, but a friend of mankind, employed his influence with this prince to preserve the Priscillianists, who were prosecuted by Ithace and by Idace, bishops of Spain. The bishop of Tours would hold no communion with men whose principles of religion inclined them to shed the blood of mankind; and he obtained the life of those whose death they had solicited. On his return to Tours, he prepared himself for the reward of his labours in another world. He died at Candes the 8th of November 397, but according to others on the 11th of November 400. His name is given to a particular opinion concerning the

Martin.

mystery

Martin. mystery of the holy Trinity. St Martin is the first of the saints confessors to whom the Latin church offered public prayers. His life is written in elegant Latin by Fortunatus, and Sulpicius Severus one of his disciples. Paul of Perigueux and Fortunatus of Poictiers have given us Sulpicius's life of Martin in verse; but they have debased the admirable prose of the author by a wretched poetical imitation. Nicolas Gervais wrote also the life of St Martin, full of many curious and entertaining facts, published at Tours in 1699, in 4to. The tradition at Amiens is, that St Martin performed the act of charity which rendered him so famous, near an ancient gate of the city, of which the ruins are still visible. The following Latin verses, which do more honour to the saint than to the poet, are inscribed on one of the stones:

Hic quondam vestem Martinus demidiavit;
Ut faceremus idem, nobis exemplificavit.

MARTIN, *Benjamin*, one of the most eminent artists and mathematicians of the age, was born in 1704. After publishing a variety of ingenious treatises, and particularly a Scientific Magazine under his own name, and carrying on for many years a very extensive trade as an optician and globe-maker in Fleet-street, the growing infirmities of age compelled him to withdraw from the active part of business. Trusting too fatally to what he thought the integrity of others, he unfortunately, though with a capital more than sufficient to pay all his debts, became a bankrupt. The unhappy old man, in a moment of desperation from this unexpected stroke, attempted to destroy himself; and the wound, though not immediately mortal, hastened his death, which happened February 9. 1782, in his 78th year. He had a valuable collection of fossils and curiosities of almost every species; which, after his death, were almost given away by public auction. His principal publications, as far as they have occurred to recollection, are, The Philosophic Grammar; being a view of the present state of experimental physiology, or natural philosophy, 1735, 8vo. A new, complete, and universal System or Body of Decimal Arithmetic, 1735, 8vo. The young Students Memorial Book, or Patent Library, 1735, 8vo. Description and Use of both the Globes, the Armillary Sphere and Orrery, 1736, 2 vols, 8vo. Memoirs of the Academy of Paris, 1740, 5 vols. System of the Newtonian Philosophy 1759, 3 vols. New Elements of Optics, 1759. Mathematical Institutions, viz. Arithmetic, Algebra, Geometry, Trigonometry, and Fluxions, 1759. Natural History of England, with a Map of each County, 1759, 2 vols. Philology, and Philosophical Geography, 1759. Mathematical Institutions, 1764, 2 vols. Lives of Philosophers, their Inventions, &c. 1764. Introduction to the Newtonian Philosophy, 1765. Institutions of Astronomical Calculations, 2 parts, 1765. Description and Use of the Air Pump, 1766. Description of the Torricellian Barometer, 1766. Appendix to the Description and Use of the Globes, 1766. Philosophia Britannica, 1778, 3 vols. Gentleman and Lady's Philosophy, 3 vols. Miscellaneous Correspondence, 4 vols. System of Philology. Philosophical Geography. Magazine complete, 14 vols. Principles of Pump-work. Theory of the Hydrometer. Doctrine of Logarithms.

Martin || Martinico

MARTIN, *St*, a small but strong town of France in the isle of Rhée, with a harbour and a strong citadel, fortified after the manner of Vauban. The island lies near the coast of Poitou. W. Long. 1. 0. N. Lat. 45. 40.

Cape MARTIN, a promontory of Valencia in Spain, near a town called *Denia*, separating the gulf of Valencia from that of Alicant.

MARTIN, *St*, an island of America, and one of the Caribbees, lying on the gulf of Mexico, to the north-west of St Bartholomew, and to the south-west of Anguilla. It is 42 miles in circumference; has neither harbour nor river, but several salt pits. After various revolutions, it is at length in possession of the French and Dutch, who possess it conjointly. W. Long. 62. 35. N. Lat. 18. 15.

MARTIN. See HIRUNDO, ORNITHOLOGY *Index*, and MUSTELA, MAMMALIA *Index*.

Free MARTIN, in *Zoology*, is a name given in this country to a cow calf cast at the same time with a bull calf, which is a kind of hermaphrodite that is never known to breed nor to discover the least inclination for the bull, nor does the bull ever take the least notice of it. See HERMAPHRODITE.

MARTINGALE, in the manege, a thong of leather, fastened to one end of the girths under a horse's belly, and at the other end to the muss-roll, to keep him from rearing.

MARTINICO, the chief of the French Caribbee islands, the middle of which is situated in W. Long. 61. 0. N. Lat. 14. 30.

This island was first settled by M. Desnambuc a Frenchman, in the year 1635, with only 100 men from St Christopher's. He chose rather to have it peopled from thence than from Europe; as he foresaw, that men, tired with the fatigue of such a long voyage, would mostly perish soon after their arrival, either from the climate, or from the hardships incident to most emigrations. They completed their first settlement without any difficulty. The natives, intimidated by their fire-arms, or seduced by promises, gave up the western and southern parts of the island to the new comers. In a short time, however, perceiving the number of these enterprising strangers daily increasing, they resolved to extirpate them, and therefore called in the savages of the neighbouring islands to assist them. They fell jointly upon a little fort that had been hastily erected; but were repulsed, with the loss of 700 or 800 of their best warriors, who were left dead on the spot.

After this check, the savages for a long time disappeared entirely; but at last they returned, bringing with them presents to the French, and making excuses for what had happened. They were received in a friendly manner, and the reconciliation sealed with pots of brandy. This peaceable state of affairs, however, was of no long continuance; the French took such undue advantage of their superiority over the savages, that they soon rekindled in the others that hatred which had never been entirely subdued. The savages, whose manner of life requires a vast extent of land, finding themselves daily more and more straitened, had recourse to stratagem, in order to destroy their

Martinico. their enemies. They separated into small bands, and way-laid the French as they came singly out into the woods to hunt, and waiting till the sportsman had discharged his piece, rushed upon and killed him before he could charge it again. Twenty men had been thus assassinated before any reason could be given for their sudden disappearance: but as soon as the matter was known, the French took a severe and fatal revenge; the savages were pursued and massacred, with their wives and children, and the few that escaped were driven out of Martinico, to which they never returned.

The French being thus left sole masters of the island, lived quietly on those spots which best suited their inclinations. At this time they were divided into two classes. The first consisted of those who had paid their passage to the island, and these were called *inhabitants;* and to these the government distributed lands, which became their own, upon paying a yearly tribute. These inhabitants had under their command a multitude of disorderly people, brought over from Europe at their expence, whom they called *engagés*, or bondsmen. This engagement was a kind of slavery for the term of three years: on the expiration of which they were at liberty, and became the equals of those whom they had served. They all confined themselves at first to the culture of tobacco and cotton; to which was soon added that of arnotto and indigo. The culture of sugar also was begun about the year 1650. Ten years after, one Benjamin d'Acosta, a Jew, planted some cocoa trees; but his example was not followed till 1684, when chocolate was more commonly used in France. Cocoa then became the principal support of the colonists, who had not a sufficient fund to undertake sugar plantations; but by the inclemency of the season in 1718, all the cocoa trees were destroyed at once.—Coffee was then proposed as a proper object of culture. The French ministry had received, as a present from the Dutch, two of these trees, which were carefully preserved in the king's botanical garden. Two young shoots were taken from these, put on board a ship for Martinico, and intrusted to the care of one Mr Desclieux. The ship happened to be straitened for want of fresh water; and the trees would have perished, had not that gentleman shared with them that quantity of water which was allowed for his own drinking. The culture of coffee was then begun, and attended with the greatest and most rapid success. About the end of last century, however, the colony had made but small advances. In 1700, it had only 6597 white inhabitants. The savages, mulattoes, and free negroes, men, women, and children, amounted to no more than 507. The number of slaves was but 14,566. All these together made a population of 21,645 persons. The whole of the cattle amounted to 3668 horses or mules, and 9217 head of horned cattle. The island produced a great quantity of cocoa, tobacco, and cotton; had nine indigo houses, and 183 small sugar plantations.

After the peace of Utrecht, Martinico began to emerge from that feeble state in which it had so long continued. The island then became the mart for all the windward French settlements. In the ports of it the neighbouring islands sold their produce, and bought the commodities of the mother country; and, in short, Martinico became famous all over Europe. In 1736, Martinico. there were on the island 447 sugar works; 11,953,232 coffee trees, 103,870 of cocoa: 2,068,480 plants of cotton, 39,400 of tobacco, 6750 of arnotto. The supplies for provisions consisted of 4,806,142 banana trees, 34,483,000 trenches of cassava; and 247 plots of potatoes and yams. The number of blacks amounted to 72,000 men, women, and children. Their labour had improved the plantations as far as was consistent with the consumption then made in Europe of American productions; and the annual exports from the island amounted to about 700,000l.

The connexions of Martinico with the other islands entitled her to the profits of commission, and the charges of transport; as she alone was in the possession of carriages. This profit might be rated at the tenth of the produce; and the sum total must have amounted to near 765,000l. This standing debt was seldom called in, and left for the improvement of their plantations. It was increased by advances in money, slaves, and other necessary articles; so that Martinico became daily more and more a creditor to the other islands, and thus kept them in constant dependence; while they all enriched themselves by her assistance.

The connexions of this island with Cape Breton, Canada, and Louisiana, procured a market for the ordinary sugars, the inferior coffee, the molasses, and rum, which would not sell in France. In exchange the inhabitants received salt fish, dried vegetables, deals, and some flour. In the clandestine trade on the coasts of Spanish America, consisting wholly of goods manufactured by the nation, she commonly made a profit of 90 per cent. on the value of about 175,000l. sent yearly to the Caraccas, or neighbouring colonies.

So many prosperous engagements brought immense sums into Martinico. Upwards of 787,000l. were constantly circulated in that island with great rapidity; and this is perhaps the only country in the world where the specie has been so considerable as to make it a matter of indifference to them whether they dealt in gold, silver, or commodities. This extensive trade brought into the ports of Martinico annually 200 ships from France; 14 or 15 fitted out by the mother country for the coast of Guinea, 60 from Canada, 10 or 12 from the islands of Margaretta and Trinidad; besides the English and Dutch ships that came to carry on a smuggling trade. The private navigation from the island to the northern colonies, to the Spanish continent, and to the windward islands, employed 120 vessels from 20 to 30 tons burden.

The war of 1744 put a stop to this prosperity. Not that the fault was in Martinico itself; its navy, constantly exercised, and accustomed to frequent engagements, which the carrying on a contraband trade required, was prepared for action. In less than six months, 40 privateers, fitted out at St Peter's, spread themselves about the latitude of the Caribbee islands. They signalized themselves in a manner worthy of the ancient freebooters; returning constantly in triumph, and laden with an immense booty. Yet, in the midst of these successes, an entire stop was put to the navigation of the colony, both to the Spanish coast and to Canada, and they were constantly disturbed even on their own coasts. The few ships that came from

Martinico. France, in order to compensate the hazards they were exposed to by the loss of their commodities, sold them at a very advanced price, and bought them at a very low one. By this means the produce decreased in value, the lands were ill cultivated, the works neglected, and the slaves perishing for want.

When every thing thus seemed tending to decay, the peace at last restored the freedom of trade, and with it the hopes of recovering the ancient prosperity of the island. The event, however, did not answer the pains that were taken to attain it. Two years had not elapsed after the cessation of hostilities, when the colony lost the contraband trade she carried on with the American Spaniards. This was owing to the substitution of register ships to the fleets; and thus were the attempts of the smugglers confined within very narrow bounds. In the new system, the number of ships was undetermined, and the time of their arrival uncertain: which occasioned a variation in the price of commodities unknown before; and from that time the smuggler, who only engaged in this trade from the certainty of a fixed and constant profit, would no longer pursue it, when it did not secure him an equivalent to the risks he ran. But this loss was not so sensibly felt by the colony, as the hardships brought upon them by the mother country. An unskilful administration clogged the reciprocal and necessary connection between the islands and North America with so many formalities, that in 1755 Martinico sent but four vessels to Canada. The direction of the colonies, now committed to the care of ignorant and avaricious clerks, soon lost its importance, sunk into contempt, and was prostituted to venality. The debts which had been contracted, during a series of calamities, had not yet been paid off, when the war broke out afresh. After a series of misfortunes and defeats, the island fell into the hands of the British. It was restored, however, in July 1763, 16 months after it had been conquered; but deprived of all the necessary means of prosperity, that had made it of so much importance. For some years past, the contraband trade carried on to the Spanish coasts was almost entirely lost. The cession of Canada had precluded all hopes of opening again a communication, which had only been interrupted by temporary mistakes. The productions of the Grenades, St Vincent, and Dominica, which were now become British dominions, could no longer be brought into their harbours; and a new regulation of the mother country, which forbade her having any intercourse with Guadaloupe, left her no hopes from that quarter.

The colony, thus deprived of every thing as it were, and destitute, nevertheless contained, at the last survey, which was taken on the 1st of January 1770, in the compass of 28 parishes, 12,450 white people of all ages and of both sexes; 1814 free blacks or mulattoes; 70,553 slaves, and 443 fugitive negroes. The number of births in 1766, was in the proportion of one in 30 among the white people, and of one in 25 among the blacks. From this observation, if it were constant, it should seem that the climate of America is much more favourable to the propagation of the Africans than of the Europeans: since the former multiply still more in the labours and hardships of slavery, than the latter in the midst of plenty and freedom. The consequence must be, that in process of time the increase of blacks in America will surpass that of the white men; and, perhaps, at last avenge this race of victims on the descendants of the oppressors. Martinico.

The cattle of the colony consists of 8283 horses or mules; 12,376 head of horned cattle; 975 hogs; and 13,544 sheep or goats.

Their provisions are, 17,930,596 trenches of cassava; 3,509,048 banana trees, and 406 squares and a half of yams and potatoes.

Their plantations contain 11,444 squares of land, planted with sugar; 6,638,957 coffee trees; 871,043 cocoa trees; 1,764,807 cotton plants; 59,966 trees of cassia, and 61 of arnotto.

The meadows or savannahs take up 10,072 squares of land; there are 11,966 in wood, and 8448 uncultivated or forsaken.

The plantations which produce coffee, cotton, cocoa, and other things of less importance, are 1515 in number. There are but 286 for sugar. They employ 116 water-mills, 12 wind-mills, and 184 turned by oxen. Before the hurricane of the 13th of August 1766, there were 302 small habitations and 15 sugar-works more.

In 1760, France imported from Martinico, upon 202 trading vessels, 177,116 quintals of fine sugar, and 12,579 quintals of raw sugar; 68,518 quintals of coffee; 11,731 quintals of cocoa; 6048 quintals of cotton; 2518 quintals of cassia; 783 casks of rum; 307 hogsheads of molasses; 150 pounds of indigo; 2147 pounds of preserved fruits; 47 pounds of chocolate; 282 pounds of rasped tobacco; 494 pounds of rope-yarn; 334 chests of liqueurs; 234 hogsheads of molasses, &c. 451 quintals of wood for dyeing; and 12,108 hides in the hair. All these productions together have been bought in the colony itself, for 536,631l. 9s. 10d. It is true, that the colony has received from the mother country to the amount of 588,412l. 16s. 6d. of merchandise; but part of this has been sent away to the Spanish coasts, and another part has been conveyed to the English settlements.

The island is 16 leagues in length and 45 in circumference, leaving out the capes, some of which extend two or three leagues into the sea. It is very uneven, and intersected in all parts by a number of hillocks; which are mostly of a conical form. Three mountains rise above these smaller eminences. The highest bears the indelible marks of a volcano. The woods with which it is covered continually attract the clouds, which occasions noxious damps, and contributes to make it horrid and inaccessible; while the two others are in most parts cultivated. From these mountains issue the many springs that water the island. These waters, which flow in gentle streams, are changed into torrents on the slightest storm. Their qualities are derived from the soil over which they flow. In some places they are excellent; in others so bad, that the inhabitants are obliged to drink the water they have collected during the rainy season.

Of all the French settlements in the West Indies, Martinico is the most happily situated with regard to the winds which prevail in those seas. Its harbours possess the inestimable advantage of affording a certain shelter from the hurricanes which annoy these latitudes. The harbour of Fort Royal is one of the best in all

the

Martinico || Martyr.

the windward islands; and so celebrated for its safety, that, when it was open to the Dutch, their shipmasters had orders from the republic to take shelter there in June, July, and August, the three months in which the hurricanes are most frequent. The lands of the Lamentin which are but a league distant, are the richest and most fertile in the whole island. The numerous streams which water this fruitful country, convey loaded canoes to a considerable distance from the sea. The protection of the fortifications secured the peaceable enjoyment of so many advantages; which, however, were balanced by a swampy and unwholesome soil. This capital of Martinico was also the rendezvous of the men of war; which branch of the navy has always oppressed the merchantmen. On this account, Fort Royal was an improper place to become the centre of trade, which was therefore removed to St Peter's. This little town, notwithstanding the fires that have four times reduced it to ashes, still contains 1700 houses. It is situated on the western coast of the island, on a bay, or inlet, which is almost circular. One part of it is built on the strand along the sea side, which is called the *anchorage;* and is the place destined for ships and warehouses. The other part of the town stands upon a low hill; it is called the *Fort*, from a small fortification that was built there in 1665, to check the seditions of the inhabitants against the tyranny of monopoly; but it now serves to protect the road from foreign enemies. These two parts of the town are separated by a rivulet.

The anchorage is at the back of a pretty high and steep hill. Shut up as it were by this hill, which intercepts the easterly winds, the most constant and most salubrious in these parts; exposed without any refreshing breezes, to the scorching beams of the sun, reflected from the hill, from the sea, and the black sand on the beach; this place is extremely hot, and always unwholesome. Besides, there is no harbour; and the ships which cannot winter safely upon this coast are obliged to take shelter at Fort Royal. But these disadvantages are compensated by the conveniency of the road of St Peter's, for loading and unloading of goods; and by its situation, which is such that ships can freely go in and out at all times, and with all winds.

Martinico again fell into the hands of the British in 1794; was given up to France in 1801; retaken in 1809, and finally restored to France by the treaty of Paris in 1814.

MARTLETS, in *Heraldry*, little birds represented without feet; and used as a difference or mark of distinction for younger brothers, to put them in mind that they are to trust to the wings of virtue and merit, in order to raise themselves, and not to their feet, they having little land to set their foot on. See HERALDRY.

MARTYNIA, a genus of plants belonging to the didynamia class; and in the natural method ranking under the 10th order, *Personatæ*. See BOTANY *Index*.

MARTYR, is one who lays down his life, or suffers death, for the sake of his religion. The word is Greek, μαρτυς, and properly signifies "a witness." It is applied, by way of eminence, to those who suffer in witness of the truth of the gospel.

The Christian church has abounded in martyrs, and history is filled with surprising accounts of their singular constancy and fortitude under the cruellest torments human nature was capable of suffering. The primitive Christians were accused by their enemies of paying a sort of divine worship to the martyrs. Of this we have an instance in the answer of the church of Smyrna to the suggestion of the Jews, who at the martyrdom of Polycarp, desired the heathen judge not to suffer the Christians to carry off his body, lest they should leave their crucified master, and worship him in his stead. To which they answered, "We can neither forsake Christ, nor worship any other: for we worship him as the Son of God; but love the martyrs as the disciples and followers of the Lord, for the great affection they have shown to their King and Master." A like answer was given at the martyrdom of Fructuosus in Spain. For when the judge asked Eulogius, his deacon, Whether he would not worship Fructuosus? as thinking, that, though he refused to worship the heathen idols, he might yet be inclined to worship a Christian martyr; Eulogius replied, "I do not worship Fructuosus, but him whom Fructuosus worships." The primitive Christians believed, that the martyrs enjoyed very singular privileges; that upon their death they were immediately admitted to the beatific vision, while other souls waited for the completion of their happiness till the day of judgment; and that God would grant chiefly to their prayers the hastening of his kingdom, and shortening the times of persecution. Martyr.

The churches built over the graves of the martyrs, and called by their names, in order to preserve the memory of their sufferings, were distinguished by the title *martyrium confessio*, or *memoria*.

The festivals of the martyrs are of very ancient date in the Christian church, and may be carried back at least till the time of Polycarp, who suffered martyrdom about the year of Christ 168. On these days the Christians met at the graves of the martyrs, and offered prayers and thanksgivings to God for the examples they had afforded them: they celebrated the eucharist, and gave alms to the poor; which, together with a panegyrical oration or sermon, and reading the acts of the martyrs, were the spiritual exercises of these anniversaries.

Of the sayings, sufferings, and deaths of the martyrs, though preserved with great care for the above purpose, and to serve as models to future ages, we have but very little left, the greatest part of them having been destroyed during that dreadful persecution which Dioclesian carried on for 10 years with fresh fury against the Christians; for a most diligent search was then made after all their books and papers; and all of them that were found were committed to the flames. Eusebius, indeed, composed a martyrology, but it never reached down to us; and those since compiled are extremely suspected. From the eighth century downwards, several Greek and Latin writers endeavoured to make up the loss, by compiling, with vast labour, accounts of the lives and actions of the ancient martyrs, but which consist of little else than a series of fables: Nor are those records that pass under the name of Martyrology worthy of superior credit, since they bear the most evident marks both of ignorance and falsehood.

MARTYR, *Peter*, a famous divine, born at Florence in 1500. He studied philosophy and the languages at Padua and Bononia, was a regular Augustine in the monastery of Fiscoli, and was counted one of the best

Martyr, Martyrology.

best preachers in Italy. Zuinglius and Bucer's writings gave him a good opinion of the Protestants, and his conversation with Valdes confirmed it. He preached that doctrine at Rome in private; but, being impeached, fled to Naples, and thence to Lucca, where he brought over to the Protestant interest Emanuel Tremellius, Celsus, Martinengas, Paul Lasicius, and Jeremiah Zanchy. He was sent for to England by King Edward VI. and made professor of divinity at Oxford in 1549. In Queen Mary's reign he returned to Strasburg, and was present at the conference of Poissy. His sentiments were not the same with Calvin's about Christ's presence in the eucharist. He wrote a great number of works, and died in 1562.

MARTYROLOGY, a catalogue or list of martyrs, including the history of their lives and sufferings for the sake of religion. The term comes from μαρτυς, "*witness*," and λογος, "*discourse*."

The martyrologies draw their materials from the kalendars of particular churches, in which the several festivals dedicated to them are marked; and which seem to be derived from the practice of the ancient Romans who inserted the names of heroes and great men in their fasti or public registers.

The martyrologies are very numerous, and contain many ridiculous and even contradictory narratives: which is easily accounted for, if we consider how many forged and spurious accounts of the lives of saints and martyrs appeared in the first ages of the church, which the legendary writers afterwards adopted without examining into the truth of them. However, some good critics, of late years, have gone a great way towards clearing the lives of the saints and martyrs from the monstrous heap of fiction they laboured under. See the article LEGEND.

The Martyrology of Eusebius of Cæsarea was the most celebrated in the ancient church. It was translated into Latin by St Jerome; but the learned agree that it is not now extant. That attributed to Beda, in the eighth century, is of very doubtful authority: the names of several saints being there found who did not live till after the time of Beda. The ninth century was very fertile in martyrologies; then appeared that of Florus, subdeacon of the church at Lyons; who however, only filled up the chasms in Beda. This was published about the year 830, and was followed by that of Waldenburtus, monk of the diocese of Treves, written in verse about the year 844, and this by that of Usuard, a French monk, and written by the command of Charles the Bald in 875, which last is the martyrology now ordinarily used in the Roman church. That of Rabanus Maurus is an improvement on Beda and Florus, written about the year 845; that of Notker, monk of St Gal, was written about the year 894. The martyrology of Addo, monk of Ferrieres, in the diocese of Treves, afterwards archbishop of Vienne, is a descendant of the Roman, if we may so call it; for Du Sollier gives its genealogy thus: The martyrology of St Jerome is the great Roman martyrology; from this was made the little Roman one printed by Rosweyd; of this little Roman martyrology was formed that of Beda, augmented by Florus. Ado compiled his in the year 858. The martyrology of Nevelon, monk of Corbie, written about the year 1089, is little more than an abridgement of that of Ado; Father Kircher also makes mention of a Coptic martyrology preserved by the Maronites at Rome.

Martyrology, Marvell.

We have also several Protestant martyrologists, containing the sufferings of the reformed under the Papists, viz. an English martyrology, by J. Fox; with others by Clark, Bray, &c.

MARTYROLOGY is also used, in the Romish church, for a roll or register kept in the vestry of each church, containing the *names* of all the saints and martyrs, both of the universal church and of the particular ones of that city or monastery.

MARTYROLOGY is also applied to the painted or written catalogues in the Romish churches, containing the foundations, obits, prayers, and masses, to be said each day.

MARVELL, ANDREW, an ingenious writer in the 17th century, was bred at Cambridge. He travelled through the most polite parts of Europe, and was secretary to the embassy at Constantinople. His first appearance in public business at home was as assistant to Dr John Milton, Latin secretary to the protector. A little before the restoration, he was chosen by his native town, Kingston upon Hull, to sit in that parliament, which began at Westminster April 25th 1660; and is recorded as the last member of parliament who received the wages or allowance anciently paid to representatives by their constituents. He seldom spoke in parliament, but he had great influence without doors upon the members of both houses; and Prince Rupert had always the greatest regard for his advice. He made himself very obnoxious to the government by his actions and writings; nothwithstanding which, King Charles II. took great delight in his conversation, and tried all means to win him over to his side, but in vain, nothing being ever able to shake his resolution. There were many instances of his firmness in resisting the offers of the court; but he was proof against all temptations. The king having one night entertained him, sent the lord treasurer Danby the next morning to find out his lodgings: which were then up two pair of stairs in one of the little courts in the Strand. He was busy writing when the treasurer opened the door abruptly upon him. Surprised at the sight of so unexpected a visitor, Mr Marvell told his Lordship, "That he believed he had mistaken his way." Lord Danby replied, "Not, now I have found Mr Marvell;" telling him he came from his majesty, to know what he could do to serve him. Coming to a serious explanation, he told the lord treasurer, that he knew the nature of courts full well; that whoever is distinguished by a prince's favour, is certainly expected to vote in his interest. The Lord Danby told him, that his majesty had only a just sense of his merits, in regard to which he only desired to know if there was any place at court he could be pleased with. These offers, though urged with the greatest earnestness, had no effect upon him. He told the lord treasurer, that he could not accept of them with honour; for he must be either ungrateful to the king in voting against him, or false to his country in giving into the measures of the court. The only favour therefore, he had to request of his majesty was, that he would esteem him as dutiful a subject as any he had, and more in his proper interest by refusing his offers than if he had embraced them. The Lord Danby finding no argu-

Marvell, Mary.

ments could prevail, told him, that the king had ordered a thousand pounds for him, which he hoped he would receive till he could think what farther to ask of his majesty. The last offer was rejected with the same stedfastness of mind as the first; though, as soon as the lord treasurer was gone, he was forced to send to a friend to borrow a guinea. He died, not without strong suspicions of his being poisoned, in 1678, in the 58th year of his age. In 1688, the town of Kingston upon Hull contributed a sum of money to erect a monument over him in the church of St Giles in the Fields, where he was interred, and an epitaph composed by an able hand; but the ministry of that church forbade both the inscription and monument to be placed there. He wrote many ingenious pieces; as, The Rehearsal transprosed; A short Historical Essay concerning General Councils, Creeds, and Impositions in matters of Religion, &c.; also Poems and Letters.

Marvel of Peru. See Mirabilis, Botany *Index*.

MARY, the mother of our Saviour Jesus Christ, and a virgin at the time that she conceived him; daughter of Joachim and of Anna, of the tribe of Judah, and married to Joseph of the same tribe. The Scripture tells us nothing of her parents, not so much as their names, unless Heli mentioned by St Luke iii. 23. be the same with Joachim. All that is said concerning the birth of Mary and of her parents is only to be found in some apocryphal writings; which, however, are very ancient.

Mary was of the royal race of David, as was also her husband; 'A virgin, espoused to a man whose name was *Joseph*, of the house of David,' says our translation of St Luke i. 27. which translation Mr Whitby thinks might be better rendered thus: A virgin of the house of David, espoused to a man whose name was *Joseph*, and the virgin's name was *Mary*; because this agrees better with the words of the angel, "The Lord shall give him the throne of his father David," ver. 32. For since the angel had plainly told the virgin, that she should have this son without the knowledge of any man, it was not Joseph's but Mary's being of the house of David, that made David his father.

Mary was akin to the race of Aaron, since Elizabeth the wife of Zacharias was her cousin (ver. 36.) Mary very early made a vow of chastity, and engaged herself to perpetual virginity. The *Proto-evangelium* of St James tells us, that she was consecrated to the Lord, and offered in the temple from her earliest youth; and that the priests gave her Joseph for a spouse, who was a holy and venerable old man, whom Providence appointed for his purpose by a miracle, the rod which he commonly carried having grown green and flourished as Aarou's did formerly. He espoused Mary, not to live with her in the ordinary use of marriage, and to have children by her, but only that he might be the guardian of her virginity. Though these circumstances are not to be relied on as certain, yet Mary's resolution of continency, even in a married state, cannot be called in question, since her virginity is attested by the gospel, and that herself speaking to the angel, who declared to her that she should become the mother of a son, told him that "she knew not a man," (ver. 34.), or that she lived in continency with her husband: for which reason, when Joseph perceived her pregnancy, he was extremely surprised at it, knowing the mutual resolution they had agreed to of living in continency though in a state of marriage. Mary.

When Mary was ready to lie in, an edict was published by Cæsar Augustus, which decreed, that all the subjects of the empire should go to their own cities, there to have their names registered according to their families. Thus Joseph and Mary, who were both of the lineage of David, betook themselves to the city of Bethlehem, from whence was the original of their family. But while they were in this place, the time being fulfilled in which Mary was to be delivered, she brought forth her first-born son. She wrapped him in swaddling-clothes, and laid him in the manger of the stable or cavern whither they had retired: for they could find no place in the public inn, because of the great concourse of people that were then at Bethlehem on the same occasion; or they were forced to withdraw into the stable of the inn, not being able to get a more convenient lodging, because of the multitude of people then at Bethlehem.

At the same time the angels made it known to the shepherds who were in the fields near Bethlehem, and who came in the night to see Mary and Joseph and the child lying in the manger, and to pay him their tribute of adoration. Mary took notice of all these things, and laid them up in her heart, (Luke ii. 19. Matth. ii. 8, 9, 10, 11, &c.). A few days after, the magi or wise men came from the east, and brought to Jesus the mysterious presents of gold, frankincense, and myrrh; after which, being warned by an angel that appeared to them in a dream, they returned into their own country by a way different from that by which they came. But the time of Mary's purification being come, that is forty days after the birth of Jesus, Mary went to Jerusalem (Luke ii. 21.), there to present her son in the temple, and there to offer the sacrifice appointed by the law for the purification of women after childbirth. There was then at Jerusalem an old man named *Simeon*, who was full of the Holy Ghost, and who had received a secret assurance that he should not die before he had seen Christ the Lord. He came then into the temple by the influence of the spirit of God, and taking the little Jesus within his arms, he blessed the Lord: and afterwards addressing himself to Mary, he told her, 'That this child should be for the rising and falling of many in Israel, and for a sign which should be spoken against; even so far as that her own soul should be pierced as with a sword, that the secret thoughts in the hearts of many might be discovered.' Afterwards when Joseph and Mary were preparing to return to their own country of Nazareth (Matth. ii. 13, 14.), Joseph was warned in a dream to retire into Egypt with Mary and the child, because Herod had a design to destroy Jesus. Joseph obeys the admonition, and they continued in Egypt till after the death of Herod; upon which he and Mary returned to Nazareth, not daring to go to Bethlehem because it was in the jurisdiction of Archelaus the son and successor of Herod the Great. Here the holy family took up their residence, and remained till Jesus began his public ministry. We read of Mary being present at the marriage of Cana in Galilee, with her son Jesus and his disciples (John ii.

Mary. 1, 2, &c.). On which occasion Jesus having turned water into wine, being the first public miracle that he performed, he went from thence to Capernaum with his mother and his brethren, or his parents and disciples: and this seems to be the place where the holy virgin afterwards chiefly resided. However, St Epiphanius thinks that she followed him everywhere during the whole time of his preaching; though we do not find the evangelists make any mention of her among the holy women that followed him and ministered to his necessities. The Virgin Mary was at Jerusalem at the last passover that our Saviour celebrated there; she saw all that was transacted against him, followed him to Calvary, and stood at the foot of his cross with a constancy worthy of the mother of God. There Jesus seeing his mother and his beloved disciple near her, he said to his mother, "Woman, behold thy son;" and to the disciple, "Behold thy mother." And from that hour the disciple took her home to his own house. It is not to be doubted, but that our Saviour appeared to his mother immediately after his resurrection; and that she was the first, or at least one of the first, to whom he vouchsafed this great consolation. She was with the apostles at his ascension, and continued with them at Jerusalem, expecting the coming of the Holy Ghost (Acts i. 14.). After this, she dwelt in the house of St John the Evangelist, who took care of her as of his own mother. It is thought that he took her along with him to Ephesus, where she died in an extreme old age. There is a letter of the œcumenical council of Ephesus, importing, that in the fifth century it was believed she was buried there. Yet this opinion was not so universal, but that there are authors of the same age who think she died and was buried at Jerusalem.

Mary Magdalen, who has been generally confounded with Mary the sister of Martha and Lazarus, but very improperly, was probably that sinner mentioned by St Luke, chap. vii. 36, 37, &c. whose name he does not tell us. There are some circumstances sufficient to convince us, that she is the same whom he calls *Mary Magdalen* in chap. viii. 2. and from whom he says Jesus drove out seven devils. Jesus having healed the widow's son of Naïn, entered into the city, and there was invited to eat by a Pharisee named *Simon*. While he was at table, a woman of a scandalous life came into the house, having an alabaster box full of perfumed oil, and standing upright behind Jesus, and at his feet, for he was lying at table on a couch after the manner of the ancients, she poured her perfume on his feet, kissed them, watered them with her tears, and wiped them with her hair. The Pharisee observing this, said within himself, If this man were a prophet, he would know who this woman is that touches him, that she is one of a wicked life. Then Jesus, who knew the bottom of his heart, illustrated her case by a parable; and concluded with answering the woman, that her sins were forgiven her. In the following chapter, St Luke tells us, that Jesus, in company with his apostles, preached the gospel from city to city: and that there were several women whom he had delivered from evil spirits, and had cured of their infirmities, among whom was Mary called *Magdalen*, out of whom went seven devils. This, it must be owned, is no positive proof that the sinner mentioned before was Mary Magdalen; however, it is all that we have in support of this opinion: An opinion which has been ably controverted by others. Mary Magdalen had her surname, it is thought, from the town of Magdalia in Galilee. Lightfoot believes that this Mary is the same with Mary the sister of Lazarus. Magdalen is mentioned by the evangelists among the women that followed our Saviour, to minister to him according to the custom of the Jews. St Luke viii. 2. and St Mark xvi. 9. observe, that this woman had been delivered by Jesus Christ from seven devils. This some understand in the literal sense; but others take it figuratively, for the crimes and wickedness of her past life (supposing her to be the sinner first above mentioned), from which Christ had rescued her. Others maintain, that she had always lived in virginity; and consequently they make her a different person from the sinner mentioned by St Luke: and by the seven devils of which she was possessed, they understand no other than a real possession, which is not inconsistent with a holy life. This indeed is the most probable opinion, and that which has been best supported. In particular, the author of a "Letter to Jonas Hanway" on the subject of Magdalen House, published in 1758, has shown by a variety of learned remarks and quotations both from the Scriptures and from the best commentators, that Mary Magdalen was not the sinner spoken of by St Luke, but on the contrary that she "was a woman of distinction, and very easy in her worldly circumstances. For a while, she had laboured under some bodily indisposition, which our Lord miraculously healed, and for which benefit she was ever after very thankful. So far as we know, her conduct was always regular and free from censure; and we may reasonably believe, that after her acquaintance with our Saviour it was edifying and exemplary. I conceive of her (continues our author) as a woman of a fine understanding, and known virtue and discretion, with a dignity of behaviour becoming her age, her wisdom, and her high station: by all which, she was a credit to him whom she followed as her master and benefactor. She showed our Lord great respect in his life, at his death, and after it; and she was one of those to whom he first showed himself after his resurrection."

Mary. Mary Magdalen followed Christ in the last journey that he made from Galilee to Jerusalem, and was at the foot of the cross with the holy virgin (John xix. 25. Mark xv. 47.). After which she returned to Jerusalem to buy and prepare the perfumes, that she might embalm him after the sabbath was over, which was then about to begin. All the sabbath day she remained in the city; and the next day early in the morning she went to the sepulchre, along with Mary the mother of James and Salome (Mark xvi. 1, 2. Luke xxiv. 1, 2.). On the way, they inquired of one another, who should take away the stone from the mouth of the sepulchre, and were sensible of a great earthquake. This was the token of our Saviour's resurrection. Being come to his tomb, they saw two angels, who informed them that Jesus was risen. Upon this Mary Magdalen runs immediately to Jerusalem, and acquaints the apostles with this good news, returning herself

Mary. herself to the sepulchre. Peter and John came also, and were witnesses that the body was no longer there. They returned: but Mary stayed, and stooping forward to examine the inside of the tomb, she there saw two angels sitting, one at the head and the other at the foot of the tomb; and immediately afterwards, upon turning about, she beheld the Lord himself. She would have cast herself at his feet to kiss them. But Jesus said to her, "Touch me not, for I am not yet ascended to my Father." As if he had said, "You shall have leisure to see me hereafter; go now to my brethren, my apostles, and tell them I am going to ascend to my God and to their God, to my Father and to their Father." Thus had Mary the happiness of first seeing our Saviour after his resurrection. (See Matth. xxxviii. 5. &c. Mark xvi. 6. &c. John xx. 11, 17.).

She returned then to Jerusalem, and told the apostles that she had seen the Lord, that she had spoken to him, and told them what he had said to her. But at first they did not believe her, till her report was confirmed by many other testimonies.—This is what the gospel informs us concerning Mary Magdalen, different from Mary the sister of Martha, though she has been often called by this name. For, as to the pretended History of Mary Magdalen, which is said to have been written in Hebrew by Marcella servant of Martha; this can only relate to Mary sister of Martha, and besides is a mere piece of imposture.

MARY, queen and tyrant of England, was eldest daughter of Henry VIII. by his first wife Catharine of Spain, and born at Greenwich in February 1517. Her mother was very careful of her education, and provided her with tutors to teach her what was fitting. Her first preceptor was the famous Linacre, who drew up for her use the Rudiments of Grammar, and afterwards *De emendata structura Latini sermonis libri sex*. Linacre dying when she was but six years old, Ludovicus Vives, a very learned man of Valenza in Spain, was her next tutor; and he composed for her *De ratione studii puerilis*. Under the direction of these excellent men, she became so great a mistress of Latin, that Erasmus commends her for her epistles in that language. Towards the end of her father's reign, at the earnest solicitation of Queen Catharine Parr, she undertook to translate Erasmus's Paraphrase on the gospel of St John; but falling into ill health, as Udall relates, partly by excessive study in this work, after she had made some progress therein, she left the rest to be done by Dr Mallet her chaplain. This translation is printed in the first volume of Erasmus's Paraphrase upon the New Testament, London, 1548, folio; and with it is a Preface, written by Udall, the famous master of Eton school, and addressed to the queen dowager (A).—Had she been educated in Spain, however, and an inquisitor had been her preceptor, she could not have imbibed more strongly the bloody principles of Romish persecution; and to the eternal disgrace of the English prelacy, though the reformation had taken root in both universities, she found English bishops ready to carry her cruel designs to subvert it into effectual execution. King Edward her brother dying the 6th of July 1553, she was proclaimed queen the same month, and crowned in October by Stephen Gardiner bishop of Winchester. Upon her accession to the throne, she declared, in her speech to the council, that she would not persecute her Protestant subjects: but in the following month, she prohibited preaching without a special license; and before the expiration of three months, the Protestant bishops were Mary.

(A) As this preface contains many reflections which may very much edify the females of this age, we shall for their sakes here transcribe a part of it. Mr Udall takes occasion in it to observe to her majesty, "The great number of noble women at that time in England, not only given to the study of human sciences and strange tongues, but also so thoroughly expert in the Holy Scriptures, that they were able to compare with the best writers, as well in enditing and penning of godly and fruitful treatises, to the instruction and edifying of realms in the knowledge of God, as also in translating good books out of Latin or Greek into English, for the use and commodity of such as are rude and ignorant of the said tongues. It was now (he said) no news in England to see young damsels in noble houses, and in the courts of princes, instead of cards and other instruments of idle trifling, to have continually in their hands either psalms, homilies, and other devout meditations, or else Paul's epistles, or some book of holy scripture matters, and as familiarly both to read or reason thereof in Greek, Latin, French, or Italian, as in English. It was now a common thing to see young virgins so trained in the study of good letters, that they willingly set all other vain pastimes at nought for learning's sake. It was now no news at all to see queens and ladies of most high estate and progeny, instead of courtly dalliance, to embrace virtuous exercises of reading and writing, and with most earnest study, both early and late, to apply themselves to the acquiring of knowledge, as well in all other liberal arts and disciplines, as also most especially of God and his holy word. And in this behalf (says he), like as to your highness, as well as for composing and setting forth many godly psalms, and divers other contemplative meditations, as also for causing these paraphrases to be translated into our vulgar tongue, England can never be able to render thanks sufficient; so may it never be able, as her deserts require, enough to praise and magnify the most noble the most virtuous, the most witty, and the most studious Lady Mary's grace, for taking such pain and travail in translating this Paraphrase of Erasmus upon the gospel of St John.—What could be a more plain declaration of her most constant purpose to promote God's word, and the free grace of his gospel?" &c. Mr Udall was mistaken; she never meant any such thing; for soon after her accession to the throne, a proclamation was issued for calling in and suppressing this very book, and all others that had the least tendency towards furthering the reformation. And Mr Walpole is of opinion, that the sickness which came upon her while she was translating St John, was all affected; "for (says he) she would not so easily have been cast into sickness, had she been employed on the Legends of St Teresa or St Catharine of Sienna."

Mary. were excluded the house of lords, and all the statutes of Edward VI. respecting the Protestant religion were repealed. In July 1544 she was married to Philip prince of Spain, eldest son of the emperor Charles V.; and now began that persecution against the Protestants for which her reign is so justly infamous. Some have supposed, that the queen was herself of a compassionate and humane disposition; and that most of those barbarities were transacted by her bishops without her knowledge or privity. Without her knowledge and privity they could not be: it would be a better defence of her to say, that a strict adherence to a false religion, and a conscientious observance of its pernicious and cruel dictates, overruled and got the better of that goodness of temper which was natural to her. But neither can this plea be reasonably admitted by any one who considers her unkind and inhuman treatment of her sister the Lady Elizabeth; her admitting a council for the taking up and burning of her father's body; her most ungrateful and perfidious breach of promise with the Suffolk men; her ungenerous and barbarous treatment of Judge Hales, who had strenuously defended her right of succession to the crown; and of Archbishop Cranmer, who in reality had saved her life. Shall we excuse all this by saying, *Tantum religio potuit suadere malorum?* Her obligations to Cranmer deserve to be more particularly set forth. Burnet says, "that her firm adherence to her mother's cause and interest, and her backwardness in submitting to the king her father, were thought crimes of such a nature by his majesty, that he came to the resolution to put her openly to death: and that when all others were unwilling to run any risk in saving her, Cranmer alone ventured upon it. In his gentle way he told the king "that she was young and indiscreet, and therefore it was no wonder if she obstinately adhered to that which her mother and all about her had been infusing into her for many years; but that it would appear strange, if he should for this cause so far forget the father, as to proceed to extremities with his own child; that if she was separated from her mother and her people, in a little time there might be ground gained on her; but that to take away her life, would raise horror through all Europe against him;" by which means he preserved her.—Along with Archbishop Cranmer, who had thus saved her life, the bishops Ridley and Latimer were also condemned for heresy at Oxford, and afterwards burnt. In 1556, the persecution became general; and Protestants of all ranks and ages, and of both sexes, fell victims to papal fury. It is observable, likewise, that the same perfidious violation of promises and treaties prevailed in the queen's council, with respect to public affairs. By the treaty of marriage concluded between the queen and Philip, it was expressly stipulated that England should not be engaged in any wars with France on account of Spain; yet in 1557, Philip, who had brought immense sums of money into England, procured an offensive and defensive alliance against France, from the English administration, and 8000 of the queen's choicest troops were sent over to the assistance of the Spaniards in the Low Countries; the loss of Calais to the French was the first fruit of this war; and some assert, that upon this single occasion the queen showed a strong attachment to her native country, lamenting this stroke so deeply, that it occasioned her death; but it is better authenticated that she was carried off by an epidemic fever, which raged so violently that it did not leave a sufficient number of men in health to get in the harvest. She had long, however, been a prey, if not to remorse, yet to disappointment and chagrin, arising from various cross accidents, such as want of children, and the absence and unkindness of Philip consequent thereupon. Her death happened Nov. 7. 1558, in the 43d year of her age, after a reign of five years, four months, and eleven days. There are some things of her writings still extant. Strype has preserved three prayers or meditations of hers: the first, "Against the Assaults of Vice;" the second, "A Meditation touching Adversity;" the third, "A Prayer to be read at the Hour of Death." In Fox's "Acts and Monuments" are printed eight of her letters to King Edward and the lords of the council, on her nonconformity, and on the imprisonment of her chaplain Dr Mallet. In the *Sylloge epistolarum* are several more of her letters, extremely curious: one of her delicacy in never having written but to three men; one of affection for her sister; one after the death of Anne Boleyn; and one very remarkable of Cromwell to her. In "Haynes's State Papers," are two in Spanish to the emperor Charles V. There is also a French letter, printed by Strype from the Cottonian library, in answer to a haughty mandate from Philip, when he had a mind to marry the Lady Elizabeth to the duke of Savoy, against the queen's and princess's inclination: it is written in a most abject manner, and a wretched style. Mary.

Mary of Medicis, wife of Henry IV. king of France, was declared sole regent of the kingdom in 1610, during the consternation which the assassination of that beloved king had occasioned. By her ambitious intrigues, the nation lost all its influence abroad, and was torn to pieces at home by contending factions. After several vicissitudes of fortune, she was abandoned by her son Louis XIII. whose reign had been constantly disturbed by the civil commotions she had occasioned; and died in indigence at Brussels in 1642, aged 68. She built the superb palace of Luxembourg at Paris, and embellished that city with aqueducts and other ornaments.

Mary queen of Scotland, daughter of James V. was born in the royal palace of Linlithgow on the 8th of December 1542. Her mother was Mary, the eldest daughter of Claude duke of Guise, and widow of Louis duke of Longueville. Her father dying a few days after her birth, she scarcely existed before she was hailed queen.

The government of a queen was unknown in Scotland; and the government of an infant queen could not command much respect from martial and turbulent nobles, who exercised a kind of sovereignty over their own vassals; who looked upon the most warlike of their monarchs in hardly any other light than as the chief of the aristocracy; and who, upon the slightest disgusts, were ever ready to fly into rebellion, and to carry their arms to the foot of the throne. James had not even provided against the disorders of a minority, by committing to proper persons the care of his daughter's education, and the administration of affairs in her name. The former of these objects, however,

Mary. however, was not neglected, though the regency of the kingdom was intrusted to very feeble hands. At six years of age Mary was conveyed to France, where she received her education in the court of Henry II. The opening powers of her mind, and her natural dispositions, afforded early hopes of capacity and merit. After being taught to work with her needle and in tapestry, she was instructed in the Latin tongue; and she is said to have understood it with an accuracy, which is in this age very uncommon in persons of her sex and elevated rank, but which was not then surprising, when it was the fashion among great ladies to study the ancient languages. In the French, the Italian, and the Spanish tongues, her proficiency was still greater, and she spoke them with equal ease and propriety. She walked, danced, and rode with enchanting gracefulness; and she was qualified by nature, as well as by art, to attain to distinction in painting, poetry, and music. To accomplish the woman was not, however, the sole object of her education. Either she was taught, or she very early discovered, the necessity of acquiring such branches of knowledge as might enable her to discharge with dignity and prudence the duties of a sovereign; and much of her time was devoted to the study of history, in which she delighted to the end of her life.

Whilst Mary resided in the court of Henry II. her personal charms made a deep impression on the mind of the Dauphin. It was in vain that the constable Montmorency opposed their marriage with all his influence. The importance of her kingdom to France, and the power of her uncles the princes of Lorraine, were more than sufficient to counteract his intrigues; and the Dauphin obtained the most beautiful princess in Christendom.

Though this alliance placed the queen of Scotland in the most conspicuous point of view, in the politest court of Europe, and drew to her those attentions which are in the highest degree pleasing to a female mind in the gaiety of youth; it may yet be considered as having accidentally laid the foundation of the greatest part of her future misfortunes. Elizabeth, who now swayed the sceptre of England, had been declared illegitimate by an act of parliament: and though the English Protestants paid no regard to a declaration which was compelled by the tyrannic violence of Henry VIII. and which he himself had indeed rendered null by calling his daughter to the throne after her brother and elder sister; yet the papists both at home and abroad had objections to the legitimacy of Elizabeth's birth, founded on principles which with them had greater weight than the acts of any human legislature. Mary was unquestionably the next heir in regular succession to the English throne, if Elizabeth should die without legitimate issue; and upon her marriage to the Dauphin, she was induced by the persuasion of her uncles, by the authority of the French king, and no doubt partly by her own ambition, to assume the title and arms of queen of England and Ireland. These, indeed, she forebore as soon as she became her own mistress; but the having at all assumed them was an offence which Elizabeth could never forgive, and which rankling in her bosom made her many years afterwards pursue the unhappy queen of Scots to the block.

Henry II. dying soon after the marriage of the Dauphin and Mary, they mounted the throne of France. In that elevated station, the queen did not fail to distinguish herself. The weakness of her husband served to exhibit her accomplishments to the greatest advantage; and in a court where gallantry to the sex, and the most profound respect for the person of the sovereign, were inseparable from the manners of a gentleman, she learned the first lessons of royalty. But this scene of successful grandeur and unmixed felicity was of short duration. Her husband Francis died unexpectedly after a short reign of sixteen months. Regret for his death, her own humiliation, the disgrace of her uncles the princes of Lorraine, which instantly followed, and the coldness of Catharine of Medicis the queen mother, who governed her son Charles IX. plunged Mary into inexpressible sorrow. She was invited to return to her own kingdom, and she tried to reconcile herself to her fate. Mary.

She was now to pass from a situation of elegance and splendour to the very reign of incivility and turbulence, where most of her accomplishments would be utterly lost. Among the Scots of that period, elegance of taste was little known. The generality of them were sunk in ignorance and barbarism; and what they termed religion, dictated to all a petulant rudeness of speech and conduct to which the queen of France was wholly unaccustomed. During her minority and absence, the Protestant religion had gained a kind of establishment in Scotland; obtained, indeed, by violence, and therefore liable to be overturned by an act of the sovereign and the three estates in parliament. The queen, too, was unhappily of a different opinion from the great body of her subjects, upon that one topic, which among them actuated almost every heart, and directed almost every tongue. She had been educated in the church of Rome, and was strongly attached to that superstition: Yet she had either moderation enough in her spirit, or discretion enough in her understanding, not to attempt any innovation in the prevailing faith of Protestantism. She allowed her subjects the full and free exercise of their new religion, and only challenged the same indulgence for her own. She contrived to attach to her, whether from his heart or only in appearance, her natural brother, the prior of St Andrew's; a man of strong and vigorous parts, who, though he had taken the usual oath of obedience to the pope, had thrown off his spiritual allegiance, and placed himself at the head of the reformers. By his means she crushed an early and formidable rebellion and in reward for his services conferred upon him a large estate, and created him earl of Murray. For two or three years her reign was prosperous, and her administration applauded by all her subjects except the Protestant preachers; and had she either remained unmarried, or bestowed her affections upon a more worthy object, it is probable that her name would have descended to posterity among those of the most fortunate and the most deserving of Scottish monarchs.

But a queen, young, beautiful, and accomplished, an ancient and hereditary kingdom, and the expectation of a mightier inheritance, were objects to excite the love and ambition of the most illustrious personages. Mary, however, who kept her eye steadily fixed on the English succession, rejected every offer of a foreign alliance; and, swayed at first by prudential motives,

Mary. motives, and afterwards by love the most excessive, she gave her hand to Henry Stuart Lord Darnley, the son of the earl of Lenox. This nobleman was, after herself, the nearest heir to the crown of England; he was likewise the first in succession after the earl of Arran to the crown of Scotland; and it is known that James V. had intended to introduce into his kingdom the Salique law, and to settle the crown upon Lenox in preference to his own daughter. These considerations made Mary solicitous for an interview with Darnley; and at that interview love stole into her heart, and effaced every favourable thought of all her other suitors. Nature had indeed been lavish to him of her kindness. He was tall of stature; his countenance and shapes were beautiful and regular; and, amidst the masks and dancing with which his arrival was celebrated, he shone with uncommon lustre. But the bounty of nature extended not to his mind. His understanding was narrow; his ambition excessive; his obstinacy inflexible; and under the guidance of no fixed principle, he was inconstant and capricious. He knew neither how to enjoy his prosperity nor how to ensure it.

On the 29th of July 1565, this ill-fated pair were married; and though the queen gave her husband every possible evidence of the most extravagant love; though she infringed the principles of the constitution to confer upon him the title of king; and though she was willing to share with him all the offices, honours, and dignities of royalty—he was not satisfied with his lot, but soon began to clamour for more power. He had not been married seven months, when he entered into a conspiracy to deprive Mary of the government, and to set himself on her throne. With this view he headed a band of factious nobles, who entered her chamber at night; and though she was then far advanced in her pregnancy, murdered her secretary in her presence, whilst one of the ruffians held a cocked pistol to her breast. Such an outrage, together with his infidelity and frequent amours, could not fail to alienate the affections of a high spirited woman, and to open her eyes to those defects in his character which the ardours of love had hitherto prevented her from seeing. She sighed and wept over the precipitation of her marriage: but though it was no longer possible to love him, she still treated him with attention and respect, and laboured to fashion him to the humour of her people.

This was labour in vain. His preposterous vanity and aspiring pride roused the resentment and the scorn of the nobles: his follies and want of dignity made him little with the people. He deserted the conspirators with whom he had been leagued in the assassination of the secretary; and he had the extreme imprudence to threaten publicly the earl of Murray, who, from his talents and his followers, possessed the greatest power of any man in the kingdom. The consequence was, that a combination was formed for the king's destruction; and, on the 10th day of February 1567, the house in which he then resided was early in the morning blown up with gunpowder, and his dead and naked body, without any marks of violence, was found in an adjoining field. Mary.

Such a daring and atrocious murder filled every mind with horror and astonishment. The queen, who had been in some measure reconciled to her husband, was overwhelmed with grief, and took every method in her power to discover the regicides; but for some days nothing appeared which could lead to the discovery. Papers indeed were posted on the most conspicuous places in Edinburgh, accusing the earl of Bothwell of the crime; and rumours were industriously circulated that his horrid enterprise was encouraged by the queen. Conscious, it is to be presumed, of her own innocence, Mary was the less disposed to believe the guilt of Bothwell, who was accused of having only acted as her instrument; but when he was charged with the murder by the earl of Lenox, she instantly ordered him on his trial. Through the management of the earl of Morton and others, who were afterwards discovered to have been partners in his guilt, Bothwell was acquitted of all share and knowledge of the king's murder; and what is absolutely astonishing, and shows the total want of honour at that time in Scotland, this flagitious man procured, by means of the same treacherous friends, a paper signed by the majority of the nobles, recommending him as a fit husband for the queen!

Armed with this instrument of mischief, which he weakly thought sufficient to defend him from danger, Bothwell soon afterwards seized the person of his sovereign, and carried her a prisoner to his castle at Dunbar. It has indeed been alleged by the enemies of the queen, that no force was employed on the occasion; that she was seized with her own consent; and that she was even privy to the subscribing of the bond by the nobles. But it has been well observed by one of her ablest vindicators (A), that "her previous knowledge of the bond, and her acquiescence in the seizure of her person, are two facts in apparent opposition to each other. Had the queen acted in concert with Bothwell in obtaining the bond from the nobles, nothing remained, but, under the sanction of their unanimous address, to have proceeded directly to the marriage. Instead of which, can we suppose her so weak as to reject that address, and rather *choose* that Bothwell should attempt to seize and carry her off by violence?—an attempt which many accidents might frustrate, and which at all events could not fail to render him or both of them odious to the whole nation. Common sense, then, as well as candour, must induce us to believe, that the scheme of seizing the queen was solely the contrivance of Bothwell and his associates, and that it was really by force that she was carried to Dunbar." Being there kept a close prisoner for 12 days; having, as there is reason to believe, actually suffered violence on her person; perceiving no appearance of a rescue; and being shown the infamous bond of the nobles; Mary promised to receive her ravisher for a husband, as in her opinion the only refuge for Mary.

(A) *Tytler's Dissertation on the Marriage of Queen Mary with the earl of Bothwell*: Transactions of the Society of Antiquaries of Scotland, vol. i.

Mary. for her injured honour. Without condemning with asperity this compliance of the queen, it is impossible not to recollect the more dignified conduct which Richardson attributes in similar circumstances to his Clarissa; and every man who feels for the sufferings, and respects the memory of Mary, must regret that she had not fortitude to resist every attempt to force upon her as a husband the profligate and audacious villain who had offered her such an insult as no virtuous woman ought ever to forgive. This, however, is only to regret that she was not more than human; that she who possessed so many perfections, should have had them blended with one defect. "In the irretrievable situation of her affairs, let the most severe of her sex say what course was left for her to follow? Her first and most urgent concern was to regain her liberty. That probably she attained by promising to be directed by the advice of her council, where Bothwell had nothing to fear." The marriage, thus inauspiciously contracted, was solemnized on the 15th of May 1567; and it was the signal for revolt to Morton, Lethington, and many of the other nobles, by whose wicked and relentless policy it had been chiefly brought about, and who had bound themselves to employ their swords against all persons who should presume to disturb so desirable an event.

As Bothwell was justly and universally detested, and as the rebels pretended that it was only against him and not against their sovereign that they had taken up arms, troops flocked to them from every quarter. The progress and issue of this rebellion will be seen in our history of SCOTLAND: suffice it to say here, that upon the faith of promises the most solemn, not only of personal safety to herself, but of receiving as much honour, service, and obedience, as ever in any former period was paid by the nobility to the princes her predecessors, the unhappy queen delivered herself into the hands of the rebels, and persuaded her husband to fly from the danger which in her apprehension threatened his life. These promises were instantly violated. The faithless nobles, after insulting their sovereign in the cruellest manner, hurried her as a prisoner to a castle within a lake, where she was committed to the care of that very woman who was the mother of her bastard brother; who, with the natural insolence of a whore's meanness, says Mr Whitaker, asserted the legitimacy of her own child and the illegitimacy of Mary; and who actually carried the natural vulgarity of a whore's impudence so far, as to strip her of all her royal ornaments, and to dress her like a mere child of fortune in a coarse brown cassoc.

In this distress the queen's fortitude and presence of mind did not forsake her: She contrived to make her escape from her prison, and soon found herself at the head of 6000 combatants. This army, however, was defeated; and, in opposition to the advice and entreaties of all her friends, she hastily formed the resolution of taking *refuge in England*. The archbishop of St Andrew's in particular accompanied her to the border; and when she was about to quit her own kingdom, he laid hold of her horse's bridle, and on his knees conjured her to return: but Mary proceeded, with the utmost reliance on the friendship of Elizabeth, which had been offered to her when she was a prisoner, and of the sincerity of which she harboured not a doubt. Mary.

That princess, however, who had not yet forgotten her assumption of the title and arms of queen of England, was now taught to dread her talents, and to be envious of her charms. She therefore, under various pretences, and in violation not only of public faith, but even of the common rights of hospitality, kept her a close prisoner for 19 years: encouraged her rebellious subjects to accuse her publicly of the murder of her husband: allowed her no opportunity of vindicating her honour: and even employed venal scribblers to blast her fame. Under this unparalleled load of complicated distress, Mary preserved the magnanimity of a queen, and practised with sincerity the duties of a Christian. Her sufferings, her dignified affability, and her gentleness of disposition, gained her great popularity in England, especially among the Roman Catholics; and as she made many attempts to procure her liberty, and carried on a constant correspondence with foreign powers, Elizabeth became at last so much afraid of her intrigues, that she determined to cut her off, at whatever hazard. With this view she prevailed upon her servile parliament to pass an act which might make Mary answerable for the crimes of all who should call themselves her partizans; and upon that flagitious statute she was tried as a traitor concerned in the conspiracy of Babington: (See SCOTLAND). Though the trial was conducted in a manner which would have been illegal even if she had been a subject of England, and though no certain proof appeared of her connexion with the conspirators, she was, to the amazement of Europe, condemned to suffer death.

The fair heroine received her sentence with great composure; saying to those by whom it was announced, "The news you bring cannot but be most welcome, since they announce the termination of my miseries. Nor do I account that soul to be deserving of the felicities of immortality, which can shrink under the sufferings of the body, or scruple the stroke that sets it free." On the evening before her execution, for which, on the succeeding morn, she prepared herself with religious solemnity and perfect resignation, she ordered all her servants to appear before her, and drank to them. She even condescended to beg their pardon for her omissions or neglects; and she recommended it to them to love charity, to avoid the unhappy passions of hatred and malice, and to preserve themselves stedfast in the faith of Christ. She then distributed among them her money, her jewels, and her clothes, according to their rank or merit. She wrote her will with her own hand, constituting the duke of Guise her principal executor; and to the king and queen of France she recommended her son, provided he should prove worthy of their esteem.—In the castle of Fotheringay she was beheaded on the 8th of February 1587, in the 45th year of her age; and her body, after being embalmed and committed to a leaden coffin, was buried with royal pomp and splendour in the cathedral of Peterborough. Twenty years afterwards her bones were, by order of her son and only child King James I. removed to Westminster, and deposited in their proper place among the kings of England.

Mary. The general character of Mary, which in the regular order of biography should now be laid before the reader, has furnished matter of controversy for 200 years.—She is universally allowed to have had considerable talents, and a mind highly cultivated. By one party she is painted with more virtues and with fewer defects than almost any other woman of the age in which she lived. By another, she is represented as guilty of the grossest crimes which a woman can commit—adultery and the murder of her husband. By all it is confessed, that, previous to her connexion with the earl of Bothwell, her life as a Christian was exemplary, and her administration as a queen equitable and mild; and it has never been denied that she bore her tedious sufferings with such resignation and fortitude as are seldom found united with conscious guilt. These are strong presumptions of her innocence. The moral characters of men change by degrees; and it seems hardly consistent with the known principles of human nature, that any person should at once plunge deliberately from the summit of virtue to the depths of vice; or, when sunk so low, should by one effort recover his original state of elevation. But in this controversy presumptions must go for nothing. The positive evidences which were brought against the queen of Scots are so conclusive, that if they be genuine she must have been guilty; and if they be spurious there can be no doubt of her innocence. They consisted of a box with letters, contracts, and sonnets, said to be written by herself and sent to the earl of Bothwell. In addition to these, the supposed confessions of the criminals who had suffered for the king's murder were originally urged as proofs of her guilt: but those confessions are now admitted by all parties to be either wholly forged, or so grossly interpolated, that no stress whatever can be laid upon them; and during Mary's life it was affirmed by her friends, and not sufficiently contradicted by her enemies, that the persons who had accused Bothwell, and were doubtless his accomplices, instead of criminating the queen, had openly protested her innocence in their dying moments.

Stuart's History of Scotland. This box then, with its contents, was the evidence upon which her accusers had the chief and indeed the only reliance; and it is upon this evidence, whatever it be, that the guilt or innocence of the Scottish princess must finally be determined. It is uniformly affirmed upon the part of the earl of Murray and his faction, that the casket with the letters and the sonnets had been left by Bothwell in the castle of Edinburgh; that this nobleman, before he fled from Scotland, sent a messenger to recover them; and that they were found in the possession of this person. The 20th day of June 1567 is fixed as the date of this remarkable discovery. The governor of the castle at that time was Sir James Balfour. George Dalgleish, a servant of Bothwell's, is named as his messenger upon this errand. He was seized, it is said, by the domestics of the earl of Morton; and it was the earl of Morton himself who made the actual production of the casket and its contents.

This story is unsupported by vouchers, contains improbabilities, and cannot be reconciled with history and events. There remains not any authentic or unsuspicious evidence that the queen had dishonoured the bed of Lord Darnley; and there is the most satisfactory evidence*, that though Bothwell was intrusted with the defence of the borders on account of his tried courage and loyalty, he was privately disliked by Mary for his uncommon zeal in the cause of Protestantism. At the very time when the queen is said to have had the most violent love for that nobleman, and with him to have been carrying on the most criminal intercourse against her husband, we know both from Randolph and from Knox, that Bothwell refused to gratify her by the smallest compliance with the ceremonies of her religion, though many of the other Protestant peers scrupled not to accompany her to the celebration of the mass. That the villain who could deliberately commit murder, should be so scrupulously conscientious with respect to modes of faith and worship, as to stand forward with a *peculiar* strain of bravery to oppose, in a favourite measure, the queen, who was *then* admitting him to her bed, and actually *forming plans* for raising him to her throne, is surely, to say the least of it, extremely improbable. Mary.

But let us suppose this non-compliance on the part of Bothwell to have been a measure concerted between the queen and him to conceal more effectually from the eyes of the public the criminal intercourse in which they were engaged; is it not very surprising, that of such politicians, the *one* should have *written* those letters, and the *other* have left them in the power of their *enemies?* The earl of Bothwell was exposed to more than suspicions of a concern in the murder of the king. These papers contained manifest proofs of his guilt. It evidently was not his interest to preserve them: or admitting, that till his marriage was solemnized with the queen he might look upon them as his best security for the realizing of his ambitious hopes, yet, after that event, when all his former friends had deserted him, he must have felt the strongest inducements to destroy such a criminal correspondence; and Mary must have been ardently animated with the same wish. The castle of Edinburgh, where the box is said to have been lodged, was at this time entirely at their command; and Sir James Balfour, their deputy, was the creature of Bothwell. If his enemies, who were now in arms against him, should possess themselves of this box and its contents, his destruction was inevitable. From his marriage till the 5th day of June, it was in his power to have destroyed the fatal papers; and if they had existed, it is not to be imagined that he would have neglected a step so expedient, not only for his own security and reputation, but also for those of the queen. During all this time, however, he made no effort to recover his box and letters: he had lodged them in the castle of Edinburgh; and there he chose to leave them in the custody of a man in whom he could not have one particle of affiance. This was excessively foolish; but his subsequent conduct was still more so. Upon the 6th day of June, it is evident that he had reason to suspect the fidelity of Sir James Balfour, since he avoided to take refuge in the castle of Edinburgh and fled to Dunbar. He returned, however, with an army in order to fight the rebels. The balance of empire might then seem to hang suspended between himself and his enemies: and in that state of things, a man of such commodious principles as Balfour appears to have been, might be inclined to do his old friend and patron a secret service, both to efface his former perfidy

* *Whitaker's Vindication.*

and

Mary. and to create himself a new interest with him in case he should be victorious over the rebels. Yet in these critical moments Bothwell neglected to make any application to him for the casket and the letters! On the 15th of June, all his towering imaginations were at once dashed to the ground. He had come to Carberry hill, followed by an army and accompanied by a queen; but he fled from it attended only by a single servant, and was glad to shelter himself in the castle of Dunbar, from the vengeance due to his crimes. Yet in this extremity of distress he is represented as trying a bold experiment, which he had not courage to try when he was fortified with the authority of his sovereign, and when he was facing the rebels in the field. In the very hour when almost every friend had deserted him, he expected a return of friendship from a man who had deserted him at first only because he *suspected him to be in danger*. At this period he sent his servant George Dalgleish to wait upon Balfour, the acting governor of the castle of Edinburgh, with a requisition for the box of letters, and to bring back the important charge, through ten thousand dangers, to Dunbar. Though this man was one of his agents in the murder of the king, and might therefore have been safely intrusted with any secret, he did not order him, as common sense requires he should have done, to destroy the letters as soon as he should get them into his possession. No! he sent him to fetch them from the castle, as if there was no danger in going thither, no doubt of receiving them there, and no difficulty in carrying them back. * To a traveller in an easy chair, all roads are smooth, and all days are fine. Accordingly this same Dalgleish, though the well-known servant of Bothwell, makes good his entrance at the gates of the city, though these were guarded by 450 harquebusiers all hostile to his master, finds his way to the castle, and delivers his message. But what is more astonishing than all, he actually receives the box of letters from Sir James Balfour. This indeed, says Mr Whitaker, "is o'erdoing Termagant; it out-herods Herod." Balfour was the ductile slave of selfishness. He had with infinite perfidiousness turned against his friend, his patron, and his queen, only because he saw them opposed by a party which he *thought* would prove too strong for them; but now when they were both plunged into the lowest state of distress, and branded with the appellation of regicides, his selfishness was suddenly changed into generosity, his meanness gave place to exalted sentiments, and, at the peril of his own life, he performed an heroical act of kindness! "In such circumstances (asks a contemporary writer), is it to be thought, either that the earl would send to the said Sir James, or that the said Sir James would send any thing to the earl? Is it likely? Is it credible?" No matter: Bothwell is made to send for his papers at a time when his difficulties and his despair render it *improbable* that he could *think* of them, and when it was absolutely *impossible* that he could *recover* them. His messenger accordingly is intercepted with the casket; and the adversaries of the queen, upon the 20th day of June, became possessed of vouchers with which they might operate her destruction. These inconsistencies are glaring, and of a force not easily to be controuled; and the story is open to other objections, which are, if possible, greater, and altogether insurmountable. Mary.

* *Whitaker's Vindication.*

By comparing different proclamations of the rebels with the several despatches of Throgmorton, who was then Elizabeth's resident in Scotland, Mr Whitaker has made it appear in the highest degree probable, that Dalgleish was *not* seized *till* the 17th of July; that he was then, in consequence of an order issued by the court of session, apprehended, together with Powrie, another of Bothwell's servants, in that nobleman's lodgings in the palace of Holyroodhouse; and that therefore he could not be the bearer of the letters intercepted by the earl of Morton on the 20th of June. What adds greatly to this probability is the account which the rebels themselves give of his examination. A few days after he was taken, he was examined, say they, judicially, in a council where the earls of Morton and Athol are marked as present. It was natural upon this occasion to make inquiries about the casket and the papers. No questions, however, were put to him on that subject. He was not confronted with Sir James Balfour, from whom he had received the casket; nor with the domestics of the earl of Morton, by whom it was said that he had been apprehended. He was kept in prison many months after this examination; and during a period when the rebels were infinitely pressed to apologize for their violence against the queen, there were opportunities without number of bringing him to a confession. These opportunities, however, were avoided; and there exists not the slightest evidence that the casket and the papers had ever been in his possession. Is it then to be supposed; that if the casket and the papers had really been discovered with *him*, the establishment of a fact so important would have been neglected by the adversaries of the queen? No! they would have established it by the most complete evidence; which they were so far from attempting to do, that the earliest account which they give of their pretended seizure of the letters is dated *fifteen months* after the event itself, and nearly *nine months* after the death of Dalgleish. To have blazoned their discovery at the time they pretend it was made, might have been attended with very disagreeable consequences: for Dalgleish, who at his execution, asserted the innocence of the queen, and actually charged the earls of Murray and Morton as the contrivers of the murder, might have found proof that the casket could not possibly have been intercepted in his custody. Mary.

The 20th of June 1567 is fixed as the æra of the discovery of the letters. If this discovery had been real, the triumph of the enemies of the queen would have been infinite. They would not have delayed one moment to proclaim their joy, and to reveal to her indignant subjects the fulness and the infamy of her guilt. They preserved, however, a long and a profound silence. It was not till the 4th of December 1567 that the papers received their first mark of notice or distinction; nor till the 16th of September 1568, that the earl of Morton was said to have intercepted them with Dalgleish. From the 20th day of June to the 4th day of December, many transactions and events of the highest importance had taken place; and the most powerful motives that have influence with men had called upon them to publish their dis-

Mary. covery. They yet made no production of the papers, and ventured not to appeal to them. In the proclamation which they issued for apprehending Bothwell, they inveigh against his guilt, and express an anxious desire to punish the regicides: yet though this deed was posterior to the 20th of June, there is no assertion in it to the dishonour of the queen; and it contains no mention of the box and the letters. An ambassador arrived in this interval from France, to inquire into the rebellion and the imprisonment of the queen; yet they apologized not for their conduct by communicating to him the contents of the casket. To Throgmorton, who had instructions to act with Mary as well as with her adversaries, they denied the liberty of waiting upon her at Lochleven, where she was detained a close prisoner; and they were earnest to impress him with the idea that her love of Bothwell was incurable. He pressed them on the subject of their behaviour to her. At different times they attempted formally to vindicate themselves; and they were uniformly vehement on the topic of the love which she bore to that nobleman. Yet they abstained from producing the letters to him. "They even spoke of her to him with *respect* and *reverence*;" which surely they could not possibly have done had they been then in possession of the letters. They were solicitous to divide the faction of the nobles who adhered to the queen; and there could not have been a measure so effectual for this end as the production of the casket and its contents; yet they called no convention of her friends, to surprise and disunite them with this fatal discovery. They flattered the Protestant clergy, attended assemblies of the church, instilled into them a belief of the queen's being guilty of murder and adultery, and incited Mr Knox to "inveigh against her vehemently in his sermons, to persuade extremities towards her, and (as Throgmorton continues) to threaten the great plague of God against the whole country and nation if she should be spared from her *condign punishment*;" but they ventured not to excite the fury of these ghostly fathers by exhibiting to them the box and the letters. They compelled the queen to subscribe a resignation of her crown; and they had the strongest reason to be solicitous to justify this daring transaction. The box and the letters would have served as a complete vindication of them; yet they neglected to take any notice of these important vouchers; and were contented with resting on the wild and frivolous pretence that the queen, from sickness and fatigue, was disgusted with the care of her kingdom.

To the irrefragable proof of the forgery of the letters arising from their having been so long concealed, it has been replied, that the rebels could not produce them sooner with any regard to their own safety. "* A considerable number of their fellow subjects, headed by some of the most powerful noblemen in the kingdom, was combined against them. This combination they could not hope to break or to vanquish without aid either from France or England. In the former kingdom, Mary's uncles, the duke of Guise and the cardinal of Lorrain, were at that period all-powerful, and the king himself was devotedly attached to her. The loading the queen, therefore, with the imputation of being accessory to the murder of her husband, would be deemed such an inexpiable crime by the court of France, as must cut off every hope of countenance or aid from that quarter. From England, with which the principal confederates had been long and intimately connected, they had many reasons to expect more effectual support; but to their astonishment, Elizabeth condemned their proceedings with asperity. Her high notions of royal authority, and of the submission due by subjects, induced her on this occasion to exert herself in behalf of Mary, not only with sincerity but with zeal: she negociated, she solicited, she threatened. From all these circumstances, the confederates had every reason to apprehend that Mary would soon obtain her liberty, and by some accommodation be restored to the whole, or at least to a considerable portion, of her authority as sovereign; and *therefore* they were afraid of the consequences of accusing her publicly of crimes so atrocious as adultery and murder." Mary.

This apology for the rebels consists of assertions for which there is no evidence, and of arguments which are wholly untenable. There is no evidence that Elizabeth exerted herself in behalf of Mary with sincerity and with zeal. If she had, she would have done more than threaten. An English army of 3000 men, aided by the Scottish combination which continued faithful to the queen, would have overturned the rebel government in the space of a month. It is inconceivable that the rebels were prevented by any apprehension of the queen's restoration from accusing her of the crimes of murder and adultery; for we learn from a despatch of Throgmorton's, dated the 19th of July 1567, that "men of good regard did then boldly and overtly by their speech, utter great rigour and extremity against their sovereign; saying, it shall not be in the power of any *within* this realm, neither *without*, to keep her from condign punishment for her notorious crimes." From another despatch of the same ambassador's, dated five days after the former, we learn, that through him they *actually did* accuse her to Elizabeth of "incontinency, as well with the earl of Bothwell as with others, and likewise of the murder of her husband, of which, they said, they had as apparent proof against her as might be; as well by the testimony of *her own hand writing*, which they had recovered, as also by sufficient witnesses." This testimony, however, was not produced till more than four months afterwards; a certain proof, that though it was now in the hands of the manufacturers, it was not yet ready for inspection.

But let us take the facts of this ablest antagonist of Mary as he has stated them, and consider the argument which they are made to support. It is apparent, from the last quoted despatch of Throgmorton *, that it could not be unknown, either to the court of France or the court of England, that the rebels were at all events determined to crown the prince, and either to put the queen to death or to keep her a close prisoner for life. These desperate enterprises, however, could not, it seems, be carried into effect without the countenance and aid of Elizabeth or Charles: but Elizabeth's notions of regal authority, and of the submission due by subjects, were high; and the French king was devotedly attached to the dethroned queen. If this was so, common sense says, that the business of the confederates, since they expected aid from these princes,

* *Robertson's Dissertation*, 13th edit.

* *Whitaker.*

Mary. princes, was to charge Mary at once with the murder and adultery, and support the charge with the most convincing evidence which they had to produce. No! says this apologist of theirs, Charles IX. would have considered such conduct as a crime inexpiable, though he might *reasonably* be expected to give them his countenance in putting to death, or keeping in perpetual prison, for a comparatively venial offence, the queen to whom he was devotedly attached! This is strange reasoning; but it seems not to have occurred to the rebels themselves. The letters made their first appearance in a secret council assembled by the earl of Murray on the 4th of December 1567; and the reason there assigned by the confederates for their unwillingness to produce them was, "That luif they beare unto hir person, wha sometime was theire sovereine, and for the reverrance of his majestie, whais moder she is, as alsua thay mony gude and excellent gifts and vertues quherewith God sometimes indowit hir." And they proceed to say, that they would not have produced them at all, "gif otherwise the sincceritie of their intentions and proceedings from the beginninge myht be known to forrein nacions and the inhabitants of this ile (of whome mony yet remains in suspence in judgement) satisfiet and resolvit of the richtnesness of theire quarrel, and the securitie of them and their posteritie be ony other meane might be providit and established." So far were they from dreaming that the production of the letters would injure their cause in the court of France, that we see they frankly acknowledged that the sincerity and rectitude of their proceedings could not otherwise be manifested to foreign nations. In this instance they think and talk like reasonable men; but they do not long preserve the same consisteney.

In this act of council the rebels discover the greatest anxiety for their pardon and security: And "the matter being largelie and with gude deliberacion ressonit at great length, and upon sundry daies; at last all the said lords, barrones, and others above expremit, can find no other way or moyen how to find or make the said securitie but be oppyngynge and reveling of the truth and *grunde of the hail matter fre the beginninge*, plainlie and uprightlie, &c. Therefore the lords of secrete council, &c. desires it to be found and declaret be the estates and haill body of the parliament, that the cause and occasion of the tacking of the queen's person upon the 15th daie of Junii, last by past, and holding and detainninge of the same within the hous and place of Lochlevin continewallie sensyne, presentlie, and in *all tymes comyng*; and generally all others things *inventit*, spoken, writtin, or donne be them or onny of them, sen the tent daie of February last by past unto the daie and date *heirof*, towiching the saied queen hir person: that cnus, and all things depending theiron or that onie wise maie apperteine theirto, &c. was in the said queen's awin default, in as far as be DIVERS HER PRIVIE LETTERS WRITTEN AND SUBSCRIVIT WITH HIR AWIN HAND, and sent by her to James Erll Bothwell, &c—and be her ungodlie and dishonourable proceedinge in a privait marriage, soddanlie and unprovisitly, it is most certain, that she was previe, art and part, and of the actual devise and deid of the for-meneionit murther of the king, her lawchful husband, our sovereigne lord's father, committit be the said James Erll Bothwell, &c." Mary.

Had the letters been really genuine, into the absurdity of this declaration no man of common sense could possibly have fallen. Truth is always consistent with itself: but in a series of forgeries contradictions are scarcely avoidable. The confederates rose in rebellion against the queen on the 10th of June: they faced her in rebellion at Carberry hill on the 15th; they sent her away into prison on the 16th: yet they afterwards justified *all* that they had done since the *tenth of February* by letters, which, they *said*, they had not till the *twentieth of June!* "This (says Mr Whitaker) if we consider it as folly, is one of the most striking and eminent acts of folly that the world has ever beheld. But it ought to be considered in a light much more dishonourable to the rebels; and as knavery, it is one of the rankest that has ever been attempted to be imposed upon the sons of men." On the 4th of December, it must be remembered that they had not fixed *any day* for the discovery of the letters. The story of the seizure of Dalgleish with the casket was not thought of till near a year afterwards; and when it was invented, they had certainly forgotten the date of their act of council. In that act, therefore, they were free to rove at large; but they roved very uncautiously. By grounding upon the letters, proceedings prior to the 10th of June, they plainly declare the discovery of these fatal papers to have been *antecedent to the twentieth*. By grounding upon them their secret messages for sedition, their private conventions for rebellion, and "every thing inventit, spokin, written, or done, be them, or anny of them, respecting the queen, Bothwell, or Darnley, sen the *tent daie of February* last by past," they even intimate the discovery to have been previous to the murder of the king; and yet by their own accounts some of the letters were then *actually unwritten*. This is astonishing; and shows the extreme difficulty of carrying to any length a consistent series of falsehoods. Even Murray, Morton, and Lethington, could not do it. They knocked down one ninepin in endeavouring to set up another; and they finally threw down all, by making them mutually and successively to strike one another.

We have not yet done with this act of council. It was with a view to the approaching convention of the estates that it had been formed and managed. It was a preparation for the parliament in which the conspirators had secured their fullest sway, and where they proposed to effectuate their pardon and security, and to establish the letters as decisive vouchers against the queen. Accordingly, upon the 15th day of December 1567, the three estates were assembled. The conspirators invited no candid or regular investigation. The friends of the nation and of the queen were overawed. Every thing proceeded in conformity to the act of council, the conspirators, by a parliamentary decree, received a full approbation of all the severities which they had exercised against the queen. A pardon by anticipation was even accorded to them for any future cruelty they might be induced to inflict upon her.—The letters were mentioned as the cause of this singular law; and this new appeal to them may be termed the second mark of their distinction. But, amidst the plenitude

Mary. plenitude of their power, the conspirators called not the estates to a free and honest examination of them. This, indeed, had the letters been genuine, would have annihilated for ever all the consequence of the queen. Upon this measure, however, they ventured not. The letters were merely produced in parliament, and an act founded on them; but the queen was not brought from her confinement to defend herself, nor was any advocate permitted to speak for her. We learn from a paper of unquestionable authenticity*, that "sindrie nobilmen that was her Grace's favouraris then present, buir with all (the rebel proceedings in this parliament), maist principellic for safety of hir Grace's lyfe, quhilk, or thair coming to parliament, was concludit and subscryvit be ane greit part of hir takeris, to be taken frae hir in meist crewel manner, as is notourlie known." By the power of this magic, the friends of Mary were bound fast. They durst not venture to question publicly the authenticity of the letters, from the dread of exposing the queen to the dagger of the assassin. The parliament, therefore, sustained these forgeries as vouchers of her guilt, without scrutiny or debate of any kind. The conspirators, who were themselves the criminals, were her accusers and her judges, and passed a law exactly in the terms in which the act of secret council had before drawn it up.

* See *Whitaker's Vindication.*

It was necessary to describe the letters both in the act of council and in the ordination of parliament; and these deeds having fortunately descended to posterity, it is apparent, from a comparison of them, that between the 4th and the 15th days of December, the letters must have undergone very essential alterations under the management of the conspirators. In the act of council the letters are described expressly as "written and *subscrivit* with the queen's awin hand;" but in the act of parliament they are said to be only "*written helilie* with hir awin hand," and there is no intimation that they were *subscribed* by her. Whence arises this difference? From a *blunder* in the clerk penning the act of council, says one: From a habit contracted by the same clerk, which made him *mechanically* add *subscribed* to *written*, says another: From the *carelessness* of the writer who transcribed the copy of the act of council which has descended to us, says a third. These subterfuges have been exposed in all their weakness by Messrs Tytler and Whitaker: but in this abstract it is sufficient to observe, that they are mere suppositions, supported by no evidence; and that the copy of the act of council which we have was given to the ministers of Elizabeth by the leaders of the faction, who were neither blundering clerks, nor under the habit of mechanically adding *subscribed* to *written*. Under one form, therefore, the letters were certainly exhibited before the council, and under another form they were produced in parliament; but had they been genuine, they would have appeared uniformly with the same face. The clerk of the council was Alexander Hay, a notary public accustomed to draw up writings and to attest them; and what puts his accuracy with respect to the leetters beyond all possibility of doubt, his description of them is authenticated in the fullest manner by the signatures of Murray, Morton, and a long train of others who formed the secret council. The letters, therefore, were actually presented to the secret council with the customary appendage of subscription to them. But when these artificers of fraud came to reflect more closely on the approach of parliament, and to prepare their letters for the inspection of the friends of Mary, they began to shrink at the thoughts of what they had done. To substantiate the charge by letters under her own hand, they had naturally annexed her own subscription, a letter *unsubscribed* being a solecism in evidence. But most unfortunately for the cause of *complete* forgery, Mary was still in possession of her own *seal*, and he who fabricated the letters was not an engraver. For this reason, "the allegit writings in form of missive letters or epistles," says the bishop of Ross, in an address to Elizabeth, "are not *sellit* or *signetit*." They were neither attested by her subscription at the bottom, nor secured by her seal on the outside. In the secret council, where all were equally embarked in rebellion, these omissions were of no importance. But that letters containing intimations of adultery and of murder, should be sent by the queen to the earl of Bothwell, with her *subscription* to them, and yet without any guard of a *seal* upon them, so far exceeds all the bounds of credibility, that they could not expect it to gain the belief of parliament. They were struck with the absurdity of their plan, and dreaded a detection. They were under the necessity of altering it; but they could not supply the defect of the seal. They, therefore, wrote over the letters anew, and withheld the subscription.

Mary.

These letters were now as complete as the conspirators wished them; yet in this state, while they were unsubscribed and unsealed, they wanted other formalities which are usual in despatches. They were without directions, and they had no dates. They must, therefore, have been sent by the queen to Bothwell as *open* and *loose papers;* yet they contained evidence against herself, and against him, of the most horrid wickedness; and Nicholas Hubert, the person who is said to have carried most of them, was of the lowest condition, and, as Dr Robertson characterizes him, "a foolish talkative fellow." He would, therefore, surely *read* those papers, which are polluted from end to end with open and uncovered adultery, and as surely *report* their contents to *others*. These are most incredible circumstances, on the supposition that the letters are authentic, unless the queen was, what none of her enemies ever represented her, an absolute idiot.

The letters in their composition bear no resemblance to the other writings of the queen. They have a vulgarity, an indelicacy, and a coarseness of expression and manner, that by no means apply to her. They breathe nothing of the passion of love besides the impulses of the sensual appetite; and they represent a queen, highly accomplished, in love with one of her subjects, as acting with all the sneaking humility of a cottager to a peer*. A few instances will show this. "*The devil sinder us,*" she is made to exclaim, "and God knit us togidder for ever for the maist faithful coupill that ever he unitit: *this is my feith; I will die in it.*" "I am," she says in another place, "varrey glad to write unto you zow quhen the rest are sleipand; fen I cannot sleip as they do, and *as I wold desyre*, that is, *in your arms*, my dear lufe." "Seeing to *obey* zow, my dear lufe, I spare *nouther honour, conscience, hasarde,*

* See *Whitaker's Vindication.*

Mary. *hasarde, nor greatness quhatsumever; tak it, I pray zow, in gude part*, as from the maist faithful luifer that ever ze had, or ever sall have." Se not hir (his wife), quhais fenzeit teires suld not be sa mikle preisit nor estemit as the trew and faithful trevellis quhilk I sustine for to *merite her place*." "God give zow, my only lufe, the hap and prosperitie quilk your *humble* and faithful lufe desyres unto zou, who *hopis to be schortly another thing to you* for the reward of my irksome travelles." "When I will put you out of dout, and cleir myselfe, *refuse it not*, my dear lufe; and suffer me to mak zou some prufe be *my obedience*, my faithfulnes, constancie, and *voluntary subjection*, quhilk I tak for the *plesandest gude* that I might resseif, *if ze will eccept it*." "Such (says Mr Whitaker) was the coarse *kirtle*, and the homely *neckatie*, in which these wretched representers of Mary dressed themselves up, for the exhibition of a queen dignified, refined, and elegant;—a queen whom, according to their own account, "God had indowit with mony gude and excellent gifts and virtues!"

The evidence which points to the forgery of the letters is profuse and instructive. In its separate parts, it is powerful and satisfactory *. When taken together, and in the union of its parts, it is invincible. But, amidst all its cogency and strength, there is a circumstance most peculiarly in its favour, and of which it required no aid or assistance. By this peculiarity, it is cased completely in steel, and armed at every point. The letters have come down to us in the French, the Scottish, and the Latin languages. Now, the conspirators affirmed, that they were written by the queen in the French language. But by a critical examination of them in these different languages, Mr Goodall demonstrated, that the pretended French originals are a translation from the Latin of Buchanan, which is itself a version from the Scotch. This is indeed acknowledged by Dr Robertson, the ablest and most persevering of all Mary's enemies, who pretends, that, so far as he knows, it never was denied. Determined, however, to support the authenticity of the letters at all events, the same elegant and ingenious writer supposes †, that the French originals are now lost, but that two or three sentences of each of those originals were retained, and prefixed to the Scottish translation; and that the French editor observing this, foolishly concluded, that the letters had been written partly in French and partly in Scottish. In support of this singular hypothesis, he proceeds to affirm, that "if we carefully consider those few French sentences of each letter which still remain, and apply to them that species of criticism by which Mr Goodall examined the whole, a clear proof will arise, that there was a French copy, not translated from the Latin, but which was itself the original from which both the Latin and Scottish have been translated." He accordingly applies this species of criticism, points out a few variations of meaning between what he calls the remaining sentences of the original French and the present Latin; and thinks, that in the former he has discovered a spirit of elegance which neither the Latin nor the Scottish have retained. His critical observations have been examined by Mr Whitaker; who makes it apparent as the noon day sun, that the doctor has occasionally mistaken the sense of the Latin, the French, and even the Scotch; and that he has *forgotten* to point out either the elegance or the spirit of any particular clauses in his pretended originals. The same masterly vindicator of Mary then turns his antagonist's artillery against himself; and demonstrates, that such variations as he has thought sufficient to prove the existence of a former French copy, are not confined to the first sentence of each of the three first letters, but are extended to other sentences, and diffused over all the letters. Hence he observes, that this mode of proving will demonstrate the *present* French, and *every* sentence in it, to be that very original, which it primarily pretended to be, which Mr Goodall has so powerfully proved it not to be, and which even the doctor himself dares not assert it is. Our limits will not admit of our transcribing the observations of these two illustrious critics; nor is it necessary that we should transcribe them. By acknowledging that "Buchanan made his translation, not from the French but from the Scottish copy (of which he justly observes, that, were it necessary, several critical proofs might be brought)," Dr Robertson, in effect, gives up his cause. Had there been any other French letters than the present †, what occasion had Buchanan for the Scotch, when he himself must have had possession of the originals? It is evident from Mr Anderson's account, that those letters were translated by Buchanan at London during the time of the conferences. He was one of the assistants appointed to the rebel commissioners, and intrusted with the whole conduct of the process against the queen. By him, with Lethington, Macgill, and Wood, the original letters were exhibited, and their contents explained to the English commissioners; and we know from the authentic history of those papers, that they were neither lost nor mislaid for many years afterwards. It cannot be pretended that Buchanan did not understand the French; for he past most of his life in that country, and taught a school there. He was, indeed, a daring zealot of rebellion; but, with all its audacity, he must have felt the task in which he was engaged a very ungracious one. When he sat down to defame, in the eyes of all Europe, a queen to whom he owed not only allegiance but also personal gratitude, it is not conceivable that he could have translated from a *Scotch translation*, had he known any thing of a *French original;* and if the rebel commissioners, who were said to produce them, knew nothing of such originals, certainly nobody else ever did: if they existed not with Buchanan, they existed nowhere.

Dr Robertson, however, has another argument against Mr Goodall, which he thinks conclusive. Of the eight letters "the five remaining (he says) never appeared in Latin: nor is there any proof of their ever being translated into that language. Four of them, however, are published in French. This entirely overturns our author's hypothesis concerning the necessity of a translation into Latin."—An authentic fact will indeed overturn any hypothesis; but, most unluckily for this argument, the doctor advances the hypothesis, and the fact rests with Mr Goodall. It is indeed true that Buchanan *published* only the three first letters in Latin at the end of his Detection; but it does not therefore follow, that the other five were never *translated into that language*. Indeed Mr Whitaker has made

* *Stuart.*

† *Dissertation.*

† *Tytler's Inquiry.*

Mary. made it as apparent as any thing can be, that the whole eight were turned into Latin for the use of the French translator, who, by his own account, understood not the Scotch. He has made it in the highest degree probable, that this translator was one *Camuz*, a French refugee; and he has demonstrated, that the translation was made in London under the eye of Buchanan himself. We do not quote his arguments, because they consist of a great number of observations which cannot be abridged; and because the translator himself confesses every thing which is of importance to the cause maintained by Mr Goodall. "Au reste (he tells us) epistras misus sur la sin," *which were all but the eighth*, "avaient esté escrites par la Royne, partie en François, partie en Escossois; et depuis traduictes ENTIEREMENT en LATIN: mais n'ayant cognoissance de la langue Escossoise, j'ay mieux aimé exprimer TOUT ce, que j'ay trouve en LATIN, que, &c. "This confession (says Mr Whitaker) takes a comprehensive sweep. It makes *all* the *seven* letters at least, and the *whole* of *each*, to have been translated into Latin, and from thence to have been rendered into French. It starts no piddling objections about sentences or half sentences, at the head or at the tail of any. It embraces all within its widespread arms. And it proves the fancied existence of a French copy at the time to be all a fairy vision; the creation of minds that have subjected their judgments to their imaginations; the invited dreams of self-delusion."

The letters, so weak on every side, and so incapable of sustaining any scrutiny, give the marks of suspicion and guilt in all the stages of their progress. Even with the parliamentary sanction afforded to them by the three estates, which the earl of Murray assembled upon the 15th day of December 1567, he felt the delicacy and the danger of employing them *openly* to the purposes for which they were invented. For while he was scheming with Elizabeth his accusation of the queen of Scots, he took the precaution to submit privately the letters to that princess by the agency of his secretary Mr Wood. The object of this secret transaction, which took place early in the month of June 1568, was most flagitious, and presses not only against the integrity of Murray, but also against that of the English queen. Before he would advance with his charge, he solicited from her an assurance that the judges to be appointed in the trial of Mary would hold the letters to be true and probative.

Stuart. By the encouragement of Elizabeth, the earl of Murray was prevailed upon to prefer his accusation*. He was soon to depart for England upon this business. A privy council was held by him at Edinburgh. He took up in it with formality the letters of the queen from the earl of Morton, and gave a receipt for them to that nobleman. That receipt is remarkable and interesting. It is dated upon the 16th of September 1568, and contains the first mention that appears in history of the discovery of the letters as in the actual possession of Dalgleish upon the 20th of June 1567. This, as we have already noticed, is a very suspicious circumstance; but it is not the only suspicious circumstance which is recorded in the receipt. In the act of secret council, and in the ordination of parliament, in December 1567, when the earl of Murray and his associates were infinitely anxious to establish the criminality of the queen, the only vouchers of her guilt to which they appealed were the letters; and at that time, doubtless, they had prepared no other papers to which they could allude. But in Murray's receipt in September 1568 there is mention of other vouchers beside the letters. He acknowledges, that he also received from the earl of Morton contracts or obligations, and sonnets or love verses. These remarkable papers, though said to have been found upon the 20th of June 1567, appeared not till September 1568; and this difficulty is not to be solved by those who conceive them to be genuine. The general arguments which affect the authenticity of the letters apply to them in full force; only it must be observed, that as the original letters were undoubtedly in Scotch, the original sonnets were as certainly written in French. This has been completely proved by Dr Robertson, and is fully admitted by Mr Whitaker, who has made it in the highest degree probable that Lethington forged the letters and Buchanan the sonnets. Be this as it may, the sonnets have every external and internal evidence of forgery in common with the letters, and they have some marks of this kind peculiar to themselves. In particular, they make the love of Mary still more grovelling than the letters made it; and with a degree of meanness, of which the soul of Lethington was probably incapable, the author of the sonnets has made the queen consider it as "na lytill honour to be maistres of her subjects gudis!" In this the dignified princess is totally lost in "the maid Marien" of her pretended imitators; and Buchanan, who in his commerce with the sex was a mere sensualist, forgot on this occasion that he was personating a lady and a queen. Mary.

There is, however, in these sonnets, one passage of singular importance, which we must not pass wholly unnoticed. The queen is made to say,

Pour luy aussi j'ay jetté mainte larme
Premier qu'il fust de ce corps possesseur,
Duquel alors il n'avoit pas le cœur.
Puis me donna un autre dur alarme,
Quand il versa de son sang mainte dragme.

For him also I powrit out mony teiris,
First quhen he made himself possessour of this body,
Of the quhilk *then he had not the heart.*
Efter he did give me an uther hard charge,
Quhen he bled of his blude great quantitie, &c.

If these sonnets could be supposed to be genuine, this passage would overthrow at once all the letters and both the contracts which were produced; and would prove, with the force of demonstration, that the seizure of Mary by Bothwell was *not* with her own consent; that he actually committed a *rape* upon her; that she had for him *no love*: and that she married him merely as a *refuge to her injured honour*. The sonnets, however, are undoubtedly spurious; but, considered in this light, the verses before us prove with equal force the full conviction in the minds of the rebels of what in an unguarded moment they actually confessed to Throgmorton, and was manifest to all the world; viz. that "the queen their sovereign was *led captive*, and by FEAR, FORCE, and (as by many conjectures may be well suspected) others EXTRAORDINARY and

more

Mary. more UNLAWFUL means COMPELLED to become bedfellow to another wife's husband." They prove likewise, that after the rape, finding Mary highly indignant at the brutality done her, Bothwell actually stabbed himself; not, we may believe, with any intention to take away his own life, but merely that by shedding many a "drachm" of blood he might mollify the heart of the queen.

But we mean not to pursue the history of the sonnets any farther. Though they were undoubtedly invented in aid of the letters, to prove that fundamental principle of the conspirators,—that the love of Mary to Bothwell was inordinate; yet they are so incompatible with history, and with one another, that they demonstrate the spuriousness of themselves, and of the evidence which they were intended to corroborate. By thus endeavouring to give an air of nature and probability to their monstrous fictions, the rebels at once betrayed the fabrication of the whole. They have themselves supplied us with a long and particular journal, to show the true dates of facts; and by that journal have their letters and their sonnets been demonstrated to be spurious. "The *makers* of these papers (says Mr Whitaker) have broken through all the barrier of their *own history*. They have started aside from the *orbit* of *their own* chronology. They have taken a flight beyond the bounds of *their own* creation, and have there placed themselves conspicuous in the PARADISE OF FOOLS."

This mass of forgery was clandestinely shown to Elizabeth's commissioners during the conferences at York: (See SCOTLAND). It was shown again to the same commissioners and others during the conferences at Westminster. But neither Mary nor her commissioners could ever procure a sight of a single letter or a single sonnet. By the bishop of Ross and the lord Herries, she repeatedly demanded to see the papers said to be written by her; but that request, in itself so reasonable, Elizabeth, with an audacity of injustice of which the history of mankind can hardly furnish a parallel, thought fit to refuse. Mary then instructed her commissioners to demand *copies* of the letters and sonnets; and offered even from these to demonstrate in the presence of the English queen and parliament, and the ambassadors of foreign princes, that the pretended originals were palpable forgeries. Even this demand was denied her; and there is undoubted evidence still existing, that neither she nor her commissioners had so much as a *copy* of these criminal papers till after those important conferences had for some time been at an end. This last demand perplexed Elizabeth; the conferences were suddenly broken up; Murray was dismissed with his box to Scotland; and the letters were seen no more!

But the letters, we are told, were at Westminster compared with letters of the queen's, and found to be in the same Roman hand. They were indeed compared with other writings; but with what writings? This question let Elizabeth's commissioners themselves answer. They collated them, they say, "with others her letters, which were showed yesternight, and avowed by THEM (the rebel commissioners) to be written by the said queen." This was such a collation as must have pronounced them to be idiots*, if we had not known them to be otherwise; and such as must pronounce them to be *knaves*, as we know them to have been men of sense. Like persons totally incompetent to the management of business, but in truth acting ministerially in the work of profligacy, they compared the letters produced, NOT with letters furnished by Mary's commissioners, NOT with letters furnished even by indifferent persons, BUT with letters *presented by the producers themselves*.—"This (says Mr Whitaker) is such an instance of imposition upon Mary and the world, as can scarcely be paralleled in the annals of knavery. Many instances of imposition, indeed, occur in the wretched history of our race; but we can hardly find one, in which the imposition was so gross, so formal, so important, and so clear. It was very gross, because it has not a shred of artifice to cover its ugly nakedness. It was very formal, because it was done by men some of whom were of the first character in their country; and all were bound by honour, and tied down by oaths, to act uprightly in the business. It was very important, because no less than the reputation of a queen, and the continuance of an usurpation, depended upon it. And it is very clear, because we have the fact related to us by the commissioners themselves, recorded to their shame in their own journal, and transmitted by their own hands to posterity with everlasting infamy on their heads." Mary.

When Tytler's *Inquiry into the Evidence produced by the Earls of Murray and Morton against Mary Queen of Scots* was first published, it was reviewed in the Gentleman's Magazine by Dr Johnson. The review, which consists of a brief analysis of the work, with reflections interspersed on the force of the evidence, concludes thus:—"That the letters were forged is now made so probable, that perhaps they will never more be cited as testimonies." Subsequent experience has shown, that the great critic's knowledge of human nature had not deserted him when he guarded his prediction with the word *perhaps*. Few authors possess the magnanimity of Fenelon: and it is not to be expected that he who has once maintained the letters to be genuine, should by reasoning or criticism be compelled to relinquish them: but we are persuaded, that, after the present generation of writers shall be extinct, these letters and sonnets will never be cited as evidence, except of the profligacy of those by whom they were fabricated.

Such is a view (partial it may be deemed by some) of this remarkable controversy previous to the publication of Mr Laing's History of Scotland. But, in opposition to all these arguments against the genuineness and authenticity of the letters and sonnets attributed to Mary, this historian observes that it is impossible to fix the supposed forgery on any one of the different persons to whom it has been ascribed, which, if true, renders it abundantly evident, that they must have been the genuine productions of the ill-fated Mary. According to Mr Laing, it was necessary for Mary to disavow the letters; and consequently her commissioners were instructed to affirm that they were forged, and that there were diverse of each sex in Scotland, particularly of those in company with her adversaries, who could counterfeit and write the queen's hand, as well as herself. This strange assertion, so apparently false, is repeated in Lesly's memorial to Elizabeth; but of those who could write and counterfeit the queen's hand, none were ever named, even in his defence of her honour; and the supposed forgery could

Whitaker.

Mary. be fixed on no particular person during Mary's life, which, it must be confessed, renders their forgery extremely suspicious. The writings suppressed in England were Lesly's and other anonymous vindications of Mary, in which there is no intimation whatever, of Lethington's confession, *that he had frequently forged the queen's hand.* The letters are those in the Cecil collection, and the Cotton library, which are equally silent; and we must conclude, that the author, whether Cotton, James, or Camden, improving on Norfolk's apology, that Lethington *moved* him to consider the queen as not guilty, asserted gratuitously that Lethington acknowledged the whole forgery, as he had already done, that Buchanan frequently repented on his deathbed, of those calumnies which he reprinted in his history, at that time in the press. He who examines with care, Camden's mutilated account of the conferences in England, must be satisfied that the evidence of the Cecil and Cotton papers, which he confessedly examined, has been suppressed in his annals, in which Norfolk's letters from York are industriously concealed. Mr Laing is of opinion, that the sonnets ascribed to Mary, are as certainly the productions of her pen, and that the grossness of some of them can only be a prevailing argument for their forgery with those who are ignorant of the grossness of the age, or foolish enough to believe with Goodall, that Mary never once betrayed a single foible from the cradle to the grave.

As to the three contracts of marriage between the queen and Bothwell, reckoned forgeries by some authors, Mr Laing is also of opinion that they are the genuine productions of Mary, who was glad to get rid of a husband whose dissolute manners had rendered him odious in her eyes; and she expressed no genuine sorrow after his extraordinary and atrocious murder. He thinks that there is not to be found in any authentic history of those times, a single convincing argument of their being forgeries. In a word, after much ingenious criticism on the merits of the contracts, he concludes by saying, that the private, instead of being a copy or abstract from the public contract, is evidently the original from which the latter was formed; and it is observable that the two first contracts written by Mary, or under her inspection, are far superior in delicacy to the last: a circumstance in vain imputed to the art of the forgers, who, in fact, were more desirous to aggravate than to extenuate the grossness of her guilt (B.)

She wrote, 1. Poems on various occasions, in the Latin, French, and Scotch languages. One of her poems is printed among those of A. Blackwood; another in Brantome's *Dames illustres*, written on the death of her first husband Francis. 2. Consolation of her long imprisonment, and royal advice to her son. 3. A copy of verses, in French, sent with a diamond ring to Queen Elizabeth. There is a translation of these verses among the Latin poems of Sir Thomas Chaloner. 4. Genuine Letters of Mary Queen of Scots, to James earl of Bothwell; translated from the French, by E. Simmonds, 1726. There are, besides, many other of her epistles to Queen Elizabeth, Secretary Cecil, Mildmaye, &c. which are preserved in the Cottonian, Ashmolean, and other libraries. Mary.

MARY II. queen of England, eldest daughter of James II. by his first wife, was born at St James's in 1662. She was bred up a Protestant, and married to William Henry of Nassau, then prince of Orange, afterwards king of England, in the 16th year of her age. She staid in Holland with her husband till February 12. 1689, when she came over, and was solemnly proclaimed queen of England, &c. She was an equal sharer with her husband in all the rights belonging to the crown; but the administration and execution thereof, were lodged solely in the king. She was a princess endowed with the highest perfections both of body and mind: she loved history, as being proper to give her useful instructions; and was also a good judge as well as a lover of poetry. She studied more than could be imagined, and would have read more than she did, if the frequent returns of ill humours in her eyes had not forced her to spare them. She gave her minutes of leisure to architecture and gardening; and since it employed many hands she said, she hoped it would be forgiven her. She was the most gracious of sovereigns to her subjects, and the most obliging of wives to her husband, as well as the most excellent of mistresses to her servants: she ordered good books to be laid in the places of attendance, that persons might not be idle while they were in their turns of service. She was exceeding zealous for a reformation of manners; charitable in the highest degree, without the least ostentation. This excellent queen died on the 28th of December 1695, at Kensington, of the smallpox, in the 33d year of her age. In her the arts lost a protectress, the unfortunate a mother, and the world a pattern of every virtue. As to her person she was tall, of a majestic graceful mien, her countenance serene, her complexion ruddy, and her features beautiful.

MARY Magdalen's Day, a festival of the Romish church, observed on the 22d of July.

MARY-Gerane's-House, a name given to Dunmorehead in the parish of Dunqueen, county of Kerry, and province

(B) This article stands in need of an apology; but whether for its length or its shortness, our readers may perhaps differ in opinion. If it be considered as a piece of common biography, and compared with the limits which we have prescribed to our other articles of the same kind, it has swelled to an extent beyond all proportion. But as a piece of common biography it ought not to be considered: it is intimately connected with the history of Scotland at a very interesting period; and it has been justly observed, by one of the ablest writers of the age, that "the fact under dispute in the life of Mary, is a fundamental and essential one; and that, according to the opinion which the historian adopts with regard to it, he must vary and dispose the whole of his subsequent narration." Viewed in this light, our abstract of the evidence which has been urged on both sides of this controversy will by many be deemed too short. To such as wish for complete satisfaction, we can only recommend the unbiassed study of the writings of *Buchanan*, *Leslie* bishop of Ross, *Goodall*, *Robertson*, *Hume*, *Tytler*, *Sir David Dalrymple*, *Stuart*, *Whitaker*, and *Laing*.

Mary || Maryland.

province of Munster, in Ireland. It is the most western point of all Europe, and called by the Irish *Ty Vorney Geerone*. It is a point as much celebrated by them as John-of-Groat's house by the Scots, which is the utmost extremity of North Britain.

MARYBOROUGH, a borough, market, and post town, and the assizes town to Queen's county, in the province of Leinster, in Ireland; so called in honour of Mary queen of England, who reduced this part of the country to shire-ground by act of parliament 6th and 7th Philip and Mary. It is governed by a burgomaster and bailiffs, and has a barrack for a troop of horse. It formerly returned two members to parliament. It is distant from Dublin 40 miles. N. Lat. 53. 0. W. Long. 7. 20.

MARYBURGH. See *Fort* WILLIAM.

MARYGOLD. See CALTHA, BOTANY *Index*.

Corn MARYGOLD. See CHRYSANTHEMUM, BOTANY *Index*.

French MARYGOLD. See TAGETES, BOTANY *Index*.

MARYLAND, one of the United States of America. It received that name in honour of Henrietta Maria, the consort of King Charles I. who made a grant of this country, with very extraordinary powers, to Lord Baltimore. It lies between 38 and 40 degrees north latitude, and in longitude from 74 to 78 degrees west from London. It is bounded on the north by Pennsylvania; on the east by the Delaware state; on the south-east and south by the Atlantic ocean, and a line drawn from the ocean over the peninsula (dividing it from Accomack county in Virginia) to the mouth of Patomack river, thence up the Patomack to its first fountain, thence by a due north line till it intersects the southern boundary of Pennsylvania, in Lat. 39° 43′ 18″; so that it has Virginia on the south, south-west, and west. It contains about 10,800 square miles, of which about one-fifth is water. It is divided into 18 counties, 10 of which are on the western and 8 on the eastern shore of Chesapeak bay. Each of the counties sends four representatives to the house of delegates; besides which, the city of Annapolis and town of Baltimore send each two, making in the whole 76 members. The climate is generally mild and agreeable, suited to agricultural productions and a great variety of fruit trees. In the interior hilly country the inhabitants are healthy: but in the flat country, in the neighbourhood of the marshes and stagnant waters, they are, as in the other southern states, subject to intermittents. Chesapeak bay divides this state into the eastern and western divisions. It affords several good fisheries; and, in a commercial view, is of immense advantage to the state. It receives a number of the largest rivers in the United States. From the eastern shore in Maryland, among other smaller ones, it receives Pokomoke, Choptank, Chester and Elk rivers; from the north the rapid Susquehannah; and from the west Patapsco, Severn, Patuxent, and Patomack, half of which is in Maryland and half in Virginia. Except the Susquehannah and Patomack, these are small rivers. East of the Blue ridge of mountains, which stretches across the western part of this state, the land, like that in all the southern states, is generally level and free of stones. Wheat and tobacco are the staple commodities of Maryland. The growth of tobacco in 1816 was estimated at 19,000 hogsheads. In the interior country, on the uplands, considerable quantities of hemp and flax are raised. Maryland.

The number of inhabitants in this state, in 1810, was 380,546, of which 111,502 were slaves, and 33,927 free blacks. Maryland is the eighth state in the union in point of population. The militia of this state in 1814 amounted to 41,000. The inhabitants, except in the populous towns, live on their plantations, often several miles distant from each other. To an inhabitant of the middle, and especially of the eastern states, which are thickly populated, they appear to live very retired and unsocial lives. The effects of this comparative solitude are visible in the countenances as well as in the manners and dress of the country people; there being among them very little of that cheerful sprightliness of look and action which is the invariable and genuine offspring of social intercourse; nor do they pay that attention to dress which is common, and which decency and propriety have rendered necessary, among people who are liable to receive company almost every day. As the negroes perform all the manual labour, their masters are left to saunter away life in sloth, and too often in ignorance. These observations, however, must in justice be limited to the people in the country, and to those particularly whose poverty or parsimony prevents their spending a part of their time in populous towns or otherwise mingling with the world. The value of lands and houses in this state in 1799, was 32,372,290 dollars; and in 1814 it had increased to 122,577,572 dollars.

The chief towns in this state are Annapolis and Baltimore.——*Annapolis*, the capital, and the wealthiest town of its size in America, is situated just at the mouth of Severn river, 30 miles south of Baltimore, and contained 2000 inhabitants in 1810. The houses are generally large and elegant; and the stadthouse is the noblest building of the kind in America.—*Baltimore* has had the most rapid growth of any town on the continent, and is the fourth in size and the fifth in trade in the United States. It lies in Lat. 39. 21. on the north side of Patapsco river, around what is called the Bason. The situation of the town is low. The houses were numbered in 1787, and found to be 1955; about 1200 of which were in the town, and the rest at Fell's point. The number of stores was 152; and of churches 9, which belong to German Calvinists and Lutherans, Episcopalians, Presbyterians, Roman Catholics, Baptists, Methodists, Quakers, Nicolites or New Quakers. The number of inhabitants was 46,555 in 1810, and in 1817 had increased to 55,000. They bear a high character in the United States for hospitality, liberality, and commercial enterprise. The trade of Maryland is principally carried on from Baltimore, with the other states, with the West Indies, and with some parts of Europe. The exports in 1817, amounted to 8,933,930 dollars, of which 5,887,884 dollars were domestic, and 3,046,046 foreign produce. The exports are wheat, flour, corn, tobacco, flax-seed, beans, pork, and timber, which are sent to the West Indies, to England, France, and the north of Europe. The imports are dry goods, hardware, wines, rum, sugar, &c. In 1815, 222,000 barrels of flour were exported to foreign places, besides 140,000 sent coastwise. The amount of manufactures in 1810, was 11,468,794 dollars.

Maryland. The Roman Catholics, who were the first settlers in Maryland, are the most numerous religious sect. Besides these, there are Protestant Episcopalians, English, Scots, and Irish Presbyterians, Germau Calvinists, German Lutherans, Friends, Papists, Methodists, and Nicolites or New Quakers. The clergymen are supported by voluntary contributions. The colleges in this state have all been founded since the year 1782, and are yet in their infancy. The names of the several seminaries are, Washington College at Chestertown, instituted in 1782; St John's College at Aunapolis, founded in 1784 (these two united form the university of Maryland, and include a Medical Institution); Cakesbury College at Abingdon, instituted by the Methodists in 1785; aud a college founded by the Roman Catholics at Georgetown. There are a few other literary institutions, of inferior note, in different parts of the state. In 1811 the sum of 25,000 dollars a year was appropriated by the legislature for the support of common schools, which are established in every county.

The legislature of this state is composed of two distinct branches, a senate and house of delegates; and styled *The General Assembly of Maryland*. The senate consists of 15 members, chosen every five years. Nine of these must be residents on the western shore and six on the eastern; they must be more than 25 years of age, must have resided in the state more than three years next preceding the election, aud have real and personal property above the value of 1000l. The house of delegates is composed of four members for each county, chosen annually on the first Monday in October. The city of Annapolis and town of Baltimore send each two delegates. The qualifications of a delegate, are full age, one year's residence in the county where he is chosen, and real or personal property above the value of 500l. Every free white male citizen above 21 years of age, and who has resided 12 months in the city or county, has a vote in the election of senators and delegates.

On the second Monday of November annually, a governor is appointed by the joint ballot of both houses. The governor cannot continue in office longer than three years successively, nor be elected until the expiration of four years after he has been out of office. The qualifications for the chief magistracy are 25 years of age, five years residence in the state next preceding the election, and real and personal estate above the value of 5000l.; 1000l. of which must be freehold estate. This constitution was established by a convention of delegates at Annapolis in 1776, and has since received some amendments.

Maryland was granted, as has been already noticed, by King Charles I. to Cecilius Calvert, baron of Baltimore in Ireland, June 20. 1632. The government of the province was by charter vested in the proprietary; but it appears that he either never exercised these powers alone, or but for a short time. The honourable Leonard Calvert, Esq. Lord Baltimore's brother, was the first governor or lieutenant general. In 1638, a law was passed, constituting the first regular house of assembly, which was to consist of such representatives, called *burgesses*, as should be elected pursuant to writs issued by the governor. These burgesses possessed all the powers of the persons electing them; but any other freemen, who did not assent to the election, might take their seats in person. Twelve burgesses or freemen, with the lieutenant general and secretary, constituted the assembly or legislature. This assembly sat at St Mary's, one of the southern counties, which was the first settled part of Maryland. In 1687, the government was taken out of the hands of Lord Baltimore by the grand convention of England. Mr Copley was appointed governor by commission from William and Mary in 1692, when the Protestant religion was established by law. In 1716, the government of this province was restored to the proprietary, aud continued in his hands till the late revolution; when, being an absentee, his property in the lands was confiscated, and the government assumed by the freemen of the province, who formed the constitution now existing. At the close of the war, Henry Harford, Esq. the natural son and heir of Lord Baltimore, petitioned the legislature of Maryland for his estate; but his petition was not granted. Mr Harford estimated his loss of quit-rents, valued at 20 years purchase, and including arrears, at 259,488l. 5s.—dollars at 7s. 6d. and the value of his manors and reserved lands at 327,441l. of the same money. See UNITED STATES, SUPPLEMENT.

Maryland || Mas.

MARYPORT, a sea port town of Cumberland, situated at the mouth of the Elne. It has a good harbour; and has 70 or 80 sail of shipping from 30 to 250 tons burden, principally employed in the coal trade; some of them sail up the Baltic for timber, flax, iron, &c. They have a furnace for cast iron and a glass-house. The population in 1811 was 3124.

MAS, LEWIS DU, natural son to Jean Louis de Montcalm Seigneur de Candiac, and a widow of rank of Rouergue, was born at Nismes in 1676. His first attention was bestowed on jurisprudence; but afterwards he was altogether occupied with mathematics, philosophy, and the study of the languages. Father Malebranche cultivated his acquaintance and esteemed his virtues. His first appearance was severe, his general temper tranquil; yet he had a lively and fertile imagination. His mind was active, full of resources, and methodical. We are indebted to his industry for the Typographical Bureau. This invention is the more ingenious, as it presents the tedious parts of education, namely, reading, writing, and the elements of languages, to the youthful mind as a delightful entertainment; and many people in France, both in the capital and in the provinces, have adopted it with success. After he had conceived the idea of this invention, he made the first trial of it on the young Candiac, who was remarkable for his understanding in his earliest years. Du Mas conducted his pupil to Paris and the principal cities in France, where he was universally admired. This prodigy was carried off in the year 1726 before he was seven years of age, and his loss had nearly deprived Du Mas of his reason. A dangerous illness was the consequence of his vexation; and he would have died of want, if a gentleman had not taken him from his garret and entertained him in his own house. Du Mas afterwards retired with Madame de Vaujour within two leagues of Paris, and died in the year 1774, aged 68. He was a philosopher both in genius and character. His works are, 1. *L'Art de transposer toutes sortes de Musiques sans etre obligé de connoître, ni le temps, ni le mode*, published at Paris in 4to.

Mas || Masbothæi.

4to. 1711. This work is extremely curious, but of no advantage to the study of music. 2. A volume in quarto, printed at Paris 1733, in four parts, entitled, *Bibliotheque des enfans*. In this treatise he has placed in a clear point of view, the system and economy of his Typographical Bureau. This invention, like every thing new, was censured by some and admired by others. The author himself defended it with much success in the journals and in several occasional pamphlets. This collection, however, is become exceedingly scarce. The Typographical Bureau was brought to perfection by M. Reybert a citizen of Avignon, who enriched it with many articles containing useful and agreeable information in geography, history, fable, &c. &c. 3. *Memoires de l'Ecosse sous le regne de Marie Stuart*, by Crawford, and translated from the English. This translation was found in manuscript in the library of the marquis d'Aubais, with whom De Mas had lived in the most intimate habits of friendship.

Mas Planta, a plant which upon the same root produces male flowers only. See *Masculus Flos*, Botany *Index*.

MASAFUERO, an island of the South sea, lying in S. Lat. 33. 45. W. Long. 80. 46. It is very high and mountainous, and at a distance seems to consist of one hill or rock. It is of a triangular form, and seven or eight leagues in circumference. There is such plenty of fish, that a boat with a few hooks and lines may very soon catch as many as will serve 100 people. Here are coal-fish, cavilliers, cod, halibut, and cray-fish. Captain Carteret's crew caught a king-fisher that weighed 87 pounds, and was five feet and a half long. The sharks were here so ravenous, that, in taking soundings, one of them swallowed the lead, by which they hauled him above water; but he regained his liberty by disgorging his prey. Seals are so numerous here, that Captain Carteret says, if many thousands were killed in a night, they would not be missed next morning. These animals yield excellent train oil; and their hearts and plucks are very good food, having a taste something like those of a hog; their skins are covered with a very fine fur. There are many birds here, and some very large hawks. Of the pintado bird one ship caught 700 in one night. Commodore Byron landed here with difficulty in 1765, in order to take in wood and water, of both which he found plenty. He found also great numbers of goats, whose flesh tasted as well as venison in England.

MASBOTHÆI, or Mesbothæi, the name of a sect, or rather of two sects; for Eusebius, or rather Hegesippus, whom he cites, makes mention of two different sects of Masbothæans. The first was one of the seven sects that rose out of Judaism, and proved very troublesome to the church; the other was one of the seven Jewish sects before the coming of Jesus Christ.

The word is derived from the Hebrew שבת, *schabat*, "to rest or repose;" and signifies *idle easy indolent people*. Eusebius speaks of them as if they had been so called from one Masbotheus their chief: but it is much more probable that their name is Hebrew, or at least Chaldaic, signifying the same thing with a Sabbatarian in our language; that is, one who makes profession of keeping Sabbath. Valesius will not allow the two sects to be confounded together: the last being a sect of Jews before, or at least contemporary with Christ; and the former a sect of heretics descended from them.

Masbothæi || Masinissa.

MASCULINE, something belonging to the male, or the stronger of the two sexes. See Male.

Masculine, is more ordinarily used in grammar to signify the first and worthiest of the genders of nouns. See Gender.

The masculine gender is that which belongs to the male kind, or something analogous to it.

Most substances are ranged under the heads of masculine or feminine.—This, in some cases, is done with show of reason; but in others is merely arbitrary, and for that reason is found to vary according to the languages, and even according to the words introduced from one language into another.—Thus the names of trees are generally feminine in Latin and masculine in the French.

Farther, the genders of the same word are sometimes varied in the same language. Thus *alvus*, according to Priscian, was anciently masculine, but is now become feminine. And *navire*, "a ship," in French, was anciently feminine, but is now masculine.

Masculine Rhyme, in the French poetry, is that made with a word which has a strong, open, and accented pronunciation; as all words have, excepting those which have an *e* feminine in their last syllable. For instance, *amour* and *jour*, *mort* and *sort*, are masculine rhymes; and *pere* and *mere*, *gloire* and *memoire*, are feminine. Hence also verses ending with a masculine rhyme, are called *masculine verses*, and those ending with a feminine rhyme, *feminine verses*. It is now a rule established among the French poets never to use the above two masculine or two feminine verses successively, except in the looser kind of poetry. Marot was the first who introduced this mixture of masculine and feminine verses, and Ronsard was the first who practised it with success. The masculine verses should always have a syllable less than the feminine ones.

Masculine Signs. Astrologers divide the signs into masculine and feminine; by reason of their qualities, which are either active, and hot or cold, accounted masculine; or passive, dry and moist, which are feminine.—On this principle they call the Sun, Jupiter, Saturn, and Mars, *masculine*; and the Moon and Venus *feminine*. Mercury, they suppose, partakes of the two. Among the signs, Aries, Libra, Gemini, Leo, Sagittarius, Aquarius, are masculine: Cancer, Capricornus, Taurus, Virgo, Scorpio, and Pisces, are feminine.

MASCULUS flos. See Flos, Botany *Index*.

MASH, a drink given to a horse, made of half a peck of ground malt put into a pail, into which as much scalding hot water is poured as will wet it very well: when that is done, stir it about, till, by tasting, you find it as sweet as honey; and when it has stood till it is lukewarm, it is to be given to the horse. This liquor is only used after a purge, to make it work the better: or after hard labour, or instead of drink in the time of any great sickness.

MASK. See Masque.

MASINISSA, a king of a small part of Africa, who at first assisted the Carthaginians in their wars against Rome;

Mash, Mason.

Rome; but afterwards joined the Romans, and became their firm ally. See NUMIDIA.

MASON, a person employed under the direction of an architect, in the raising of a stone building. The chief business of a mason is to make the mortar; raise the walls from the foundation to the top, with the necessary retreats and perpendiculars; to form the vaults, and employ the stones as delivered to him. When the stones are large, the business of hewing or cutting them belongs to the stonecutters, though these are frequently confounded with masons; the ornaments of sculpture are performed by carvers in stones or sculptors.

MASON, *William*, an English poet of distinction, born in 1725, was the son of a clergyman who held the living of Hull. He took his first degrees at St John's college, Cambridge in 1745, whence he removed to Pembroke college, of which he was admitted a fellow in 1747. He was M. A. in 1749, a minister in 1754. The earl of Holdernesse presented him to the valuable rectory of Aston in Yorkshire, and procured for him the office of chaplain to his majesty. His ode on the installation of the duke of Newcastle as chancellor of the university of Cambridge was the first specimen of his poetical talents, which gained him considerable reputation, although the subject was not popular. His monody to the memory of Pope, and Isis, an elegy, added to his fame, which was still farther increased by his dramatic poem of Elfrida in 1752, and Caractacus in 1759.

He did not succeed in writing tragedy, as he did not compose for the modern stage, but wished to revive the manner of the ancients. He published a small collection of odes in 1756, intended as an imitation of his dear friend Gray. He gave the world some elegies in 1763, which in general are marked with the simplicity of language proper to this species of composition, breathing noble sentiments of freedom and of virtue. In point of morality he may justly be considered as the purest of poets, and one of the warmest friends of civil liberty by which the age he lived in was distinguished. The first book of his English Garden made its appearance in 1772, a didactic poem in blank verse, of which the fourth and last book was printed in the year 1781. Some good critics consider this poem as rather stiff, and the dry minuteness of the preceptive part, prevented it from bringing the author any great degree of popularity. In 1775 he published the poems of Mr Gray, to which he prefixed memoirs of his life and writings. His observations on the character and genius of his friend did honour to his taste and feelings, and of consequence the volume was favourably received.

At the place of his residence he acted with the friends of reform, and the enemies of such measures as were deemed incompatible with the liberties of freemen. During the continuance of the American war, he addressed an ode to the naval officers of Great Britain, on the acquittal of Admiral Keppel in 1779, in which he decidedly execrated the war carrying on against the people of America. When Mr Pitt rose to power in 1782, Mason addressed an ode to him, which contained patriotic and manly sentiments, but his lyric imagery did it considerable injury. He published in 1783 a poetical translation of Fresnoy's Latin poem on the art of painting, which unites great elegance of language and versification with a correct representation of a difficult original.

Mason, Masonry.

Besides the living with which he was presented soon after taking orders, he obtained the preferments of precentor and canon residentiary of the cathedral of York. At that church he preached an occasional discourse in 1788 on the subject of the slave-trade, full of animated declamation against the inhumanity of the traffic. The centenary commemoration of the revolution in that year produced his secular ode, which breathed his usual spirit of freedom. An additional volume of his poems was given to the world in 1797, consisting of miscellaneous pieces, the revised productions of his youth, and the effusions of his old age. In his Palinody to Liberty we behold the change wrought in his political principles by the melancholy events of the French revolution.

Mr Mason died in April 1797, at the age of 72, in consequence of a mortification by a hurt in his leg. He had married an amiable lady, who died of a consumption in 1767, and was buried at Bristol cathedral, under a monument on which are inscribed some very tender and beautiful lines by her husband. The character of Mason in private life was exemplary for worth and active benevolence. A tablet has been placed to his memory in Poets Corner in Westminster abbey. Some satirical pieces of merit have been ascribed to him, but some are of opinion that the internal evidence is sufficient to decide against his title to them; yet it must be allowed that he could write with energy and simplicity, and the objects of satire in these pieces are such as it was extremely probable that he would fix upon.

MASONRY, in general, a branch of architecture, consisting in the art of hewing or squaring stones, and cutting them level or perpendicular, for the uses of building: but, in a more limited sense, masonry is the art of assembling and joining stones together with mortar.

Hence arise as many different kinds of masonry as there are different forms and manners for laying or joining stones. Vitruvius mentions several kinds of masonry used among the ancients; three of hewed stone, viz. that in form of a net, that in binding, and that called the *Greek masonry;* and three of unhewed stones, viz. that of an equal course, that of an unequal course, and that filled up in the middle; and the seventh was a composition of all the rest.

Net masonry, called by Vitruvius *reticulatum*, from its resemblance to the meshes of a net, consists of stones squared in their courses, and so disposed as that their joints go obliquely; and their diagonals are the one perpendicular and the other level. This is the most agreeable masonry to the eye, but it is very apt to crack.

Bound masonry, is that in which the stones were placed one over another, like tiles; the joints of their beds being level, and the mounters perpendiculars, so that the joint that mounts and separates two stones always falls directly over the middle of the stone below. This is less beautiful than the net work; but it is more solid and durable.

Greek masonry, according to Vitruvius, is that where after we have laid two stones, each of which makes a course,

Masonry. course, another is laid at the end, which makes two courses, and the same order is observed throughout the building; this may be called *double binding*, in regard the binding is not only of stones of the same course with one another, but likewise of one course with another course.

Masonry by equal courses, called by the ancients *isodomum*, differs in nothing from the bound masonry, but only in this, that its stones are not hewn.

Masonry by unequal courses, called *pseudisodomum*, is also made of unhewed stones, and laid in bound work; but then they are not of the same thickness, nor is there any equality observed excepting in the several courses, the courses themselves being unequal to each other.

Masonry filled up in the middle, is likewise made of unhewed stones, and by courses: but the stones are only set in order as to the courses.

Compound masonry is of Vitruvius's proposing, so called as being formed of all the rest. In this the courses are of hewed stone; and the middle being left void, is filled up with mortar and pebbles thrown in together: after this the stones of one course are bound to those of another course with iron cramps fastened with melted lead. Masonry.

All the kinds of masonry now in use may be reduced to these five, viz. bound masonry; that of brick work, where the bodies and projectures of the stones enclose square spaces or pannels, &c. set with bricks; that de moilon, or small work, where the courses are equal, well squared, and their edges or beds rusticated; that where the courses are unequal; and that filled up in the middle with little stones and mortar.

MASONRY, FREE,

DENOTES the rule or system of mysteries and secrets peculiar to the society of free and accepted masons.

Cause of the separation of professions. 1. When men are in a state of barbarity, and are scattered over the surface of a country in small and independent tribes, their wants are as small in magnitude, as they are few in number. It is in the power, therefore, of every individual, to perform for himself and his family, every work of labour which necessity or comfort requires; and while, at one time, he equips himself for the chase or the combat, at another he is rearing a habitation for his offspring, or hollowing his canoe to surmount the dangers of the sea. But as soon as these tribes associate together, for the purposes of mutual protection and comfort, civilization advances apace; and, in the same proportion, the wants and desires of the community increase. In order to gratify these, the ingenuity of individuals is called forth; and those, who, from inability or indolence, cannot satisfy their own wants, will immediately resort to the superior skill of their neighbours. Those members of the community, who can execute their work with the greatest elegance and celerity, will be most frequently employed; and, from this circumstance, combined with the principle of emulation, and other causes, that distinction of professions will arise, which is found only among nations considerably advanced in civilization and refinement.

Reasons why architecture must have been the first profession. 2. One of the first objects of man, in a rude state, is to screen himself and his family from the heat of the tropic sun, from the inclemency of the polar regions, or from the sudden changes of more temperate climates. If he has arrived at such a degree of improvement, as to live under the dominion of a superior, and under the influence of religious belief, the palace of his king, and the temple of his gods, will be reared in the most magnificent style which his skill can devise and his industry accomplish, and decked with those false ornaments which naturally catch the eye of unpolished men. From that principle which impels the lower orders to imitate the magnificence and splendour of their superiors, a foundation will be laid for improvement in the art of building; and it is extremely probable, from the circumstances which have been mentioned, as well as from others which the slightest reflection will suggest, that architecture will be the first profession to which men will exclusively devote their attention, and for which they will be trained by an established course of preparatory education.

Architecture superior to every other mechanical profession. 3. Nor is it from this ground only, that masonry derives its superiority as a separate profession. While many other arts administer to our luxury and pride, and gratify only those temporary wants and unnatural desires which refinement has rendered necessary, the art of building can lay claim to a higher object. The undertakings of the architect, not only furnish us with elegant and comfortable accommodation from the inclemency of the seasons, from the rapacity of wild beasts, and the still more dangerous rapacity of man; they contribute also to the ornament and glory of nations, and it is to them that we are indebted for those fortresses of strength which defend us from the inroads of surrounding enemies. Nor can the works of the architect be ranked among those objects which furnish amusement and accommodation for a few years, or at most during the short term of human life; they descend unimpaired from generation to generation; they acquire additional grandeur and value from an increase of age; and are the only specimens of human labour which in some measure, survive the revolutions of kingdoms, and the waste of time. The splendid remains of Egyptian, Grecian, and Roman architecture, which, in every age, have attracted the attention of the learned, and excited the astonishment of the vulgar, are standing monuments of the ingenuity and power of man; and, in ages yet to come, they will reflect a dignity on the art of building, to which no other profession can arrogate the slightest claim.

Other causes of the pre-eminence of architecture. 4. But there is still another consideration, which entitles architecture to a decided pre-eminence among the other arts. It is itself the parent of many separate professions; and requires a combination of talents, and an extent of knowledge, for which other professions have not the smallest occasion. An acquaintance with the

sciences

Masonry.

sciences of geometry and mechanical philosophy, with the arts of sculpture and design, and other abstruse and elegant branches of knowledge, are indispensable requisites in the education of a good architect; and raise his art to a vast height above those professions, which practice alone can render familiar, and which consist in the mere exertion of muscular force. It appears, then, from these considerations, that there is some foundation in the very nature of architecture, for those extraordinary privileges to which masons have always laid claim, and which they have almost always possessed—privileges, which no other artists could have confidence to ask, or liberty to enjoy; and there appears to be some foundation for that ancient and respectable order of free masons, whose history we are now to investigate.

5. But, that we may be enabled to discover free masonry under those various forms which it has assumed in different countries, and at different times, before it received the name which it now bears, it will be necessary to give a short description of the nature of this institution, without developing those mysteries, or revealing those ceremonial observances which are known only to the brethren of the order.

Description of the institution of free masonry.

6. Free masonry is an ancient and respectable institution, embracing individuals of every nation, of every religion, and of every condition in life. In order to confirm this institution, and attain the ends for which it was originally formed, every candidate comes under a solemn engagement never to divulge the mysteries of the order, nor communicate to the uninitiated the secrets with which he may be entrusted, and the proceedings and plans in which the fraternity may be engaged. After the candidate has undergone the necessary ceremonies, and received the usual instructions, appropriate words and significant signs are imparted to him, that he may be enabled to distinguish his brethren of the order from the uninitiated vulgar, and convince others that he is entitled to the privileges of a brother, should he be visited by distress or want, in a distant land. If the newly admitted member be found qualified for a higher degree, he is promoted, after due intervals of probation, till he has received that masonic knowledge, which enables him to hold the highest offices of trust to which the fraternity can raise its members. At regular and appointed seasons, convivial meetings of the fraternity are held in lodges constructed for this purpose: temperance, harmony, and joy, characterise these mixed assemblies. All distinctions of rank seem to be laid aside, all differences in religious and political sentiments are forgotten: and those petty quarrels which disturb the quiet of private life, cease to agitate the mind. Every one strives to give happiness to his brother; and men seem to recollect, for once, that they are sprung from the same origin, that they are possessed of the same nature, and are destined for the same end.

Masonry.

7. Such are the prominent features of an institution, which has of late produced so great division in the sentiments of the learned, respecting its origin and tendency. While a certain class of men (A), a little over-anxious for the dignity of their order, have represented it as coeval with the world; others, influenced by an opposite motive, have maintained it to be the invention of English Jesuits, to promote the views of that intriguing and dangerous association (B). Some philosophers, among whom we may reckon the celebrated Chevalier Ramsay, have laboured to prove, that free masonry arose during the crusades; that it was a secondary order of chivalry; that its forms originated from that warlike institution, and were adapted to the peaceful habits of scientific men (C). Mr Clinch (D) has attempted, with considerable ingenuity and learning, to deduce its origin from the institution of Pythagoras. M. Barruel (E) supposes it to be a continuation of the society of knights templars; while others, with a degree of audacity and malice rarely to be found in the character of ingenuous men, have imputed the origin of free masonry to secret associations, averse to the interests of true government, and pursuing the villanous and chimerical project of levelling the distinctions of society, and freeing the human mind from the sacred obligations of religion and morality.

Various opinions about the origin of free masonry.

8. Without adopting any of these untenable opinions, or attempting to discover the precise period when free masonry arose, it may be sufficient to establish its claim to an early origin, and to shew that it has existed in different ages of the world under different forms and appellations (F). In the execution of this task, the candid inquirer will be satisfied with strong and numerous resemblances, as the nature of the subject excludes the possibility of rigid demonstration. Every human institution is subject to great and numerous variations; the different aspects under which they appear, and the principles by which they are regulated, depend upon the progress of civilization, upon the nature of the government by which they are protected, and on the peculiar opinions and habits of their members. If therefore, in comparing free masonry with other ancient associations, we should find it coincide with them in every circumstance, there would be strong reasons for suspecting, that the imagination of the writer had counterfeited resemblances when destitute of authentic information; or that the order had adopted the rites and ceremonies of antiquity, to cloak the recency of their origin,

Free masonry has existed under different forms in different countries.

(A) Anderson's History and Constitutions of Free Masonry, p. 1. Preston's Illustrations of Masonry, p. 6. tenth edition.

(B) Manuscript of Bode of Germany, in the possession of M. Mounier.

(C) Leyden's Preliminary Dissertation to the Complaynt of Scotland, p. 67, 71.

(D) Anthologia Hibernica, for January, March, April, and June 1794.

(E) Memoirs of Jacobinism, vol. ii. p. 377, 378, &c.

(F) M. Mounier observes, that if the order of free masons existed among the ancients, it would have been mentioned by cotemporary writers. This argument, however, for the recency of their origin, is far from being conclusive. For though it is allowed by all, that free masonry has existed in this country for at least 300 years, yet the association is never *once* mentioned in any of the histories of England.

Masonry. origin, to command the veneration and excite the notice of the public. Against free masonry, however, this charge cannot be preferred: we shall have occasion to consider it when connected with the idolatry of the heathens, when devoted to the church of Rome, and when flourishing under the milder influence of the reformed religion.

Reasons why the knowledge of architecture would be confined to a few.

9. As men, in the early ages of society, were destitute of those methods of diffusing knowledge which we now enjoy, and even of those which were used in Greece and Rome, when the art of printing was unknown; the few discoveries in art and science which were then made, must have been confined to a small number of individuals. In these ages, the pursuit of science must have been a secondary consideration, and those who did venture to explore the untrodden regions of knowledge, would overlook those unsubstantial speculations, which merely gratify the curiosity of philosophers; and would fix their attention on those only which terminate in public utility, and administer to the necessities of life. As architecture could only be preceded by agriculture, it must have been in this science that the first efforts of human skill were tried; and in which man must have first experienced success in extending his dominion over the works of nature. The first architects, therefore, would be philosophers. They alone required the assistance of art; and they alone would endeavour to obtain it. The information which was acquired individually, would be imparted to others of the same profession; and an association would be formed for the mutual communication of knowledge, and the mutual improvement of its members. In order to preserve among themselves that information which they alone collected; in order to excite amongst others a higher degree of respect for their profession, and prevent the intrusion of those who were ignorant of architecture, and, consequently, could not promote the object of the institution, appropriate words and signs would be communicated to its members; and significant ceremonies would be performed at their initiation, that their engagement to secrecy might be impressed upon their minds, and greater regard excited for the information they were to receive. Nor is this mere speculation; there exist at this day, in the deserts of Egypt, such monuments of architecture, as must have been reared in those early ages which precede the records of authentic history; and the erection of these stupendous fabrics, must have required an acquaintance with the mechanical arts, which is not in the possession of modern architects. It is an undoubted fact, also, that there existed, in these days, a particular association of men, to whom scientific knowledge was confined, and who resembled the society of free masons in every thing but the name,

Causes of the union of religious rites with the mysteries of free masonry.

10. In Egypt, and those countries of Asia which lie contiguous to that favoured kingdom, the arts and sciences were cultivated with success, while other nations were involved in ignorance: it is here, therefore, that free masonry would flourish, and here only can we discover marks of its existence in the remotest ages. It is extremely probable, that the first and the only object of the society of masons, was the mutual communication of knowledge connected with their profession; and that those only would gain admittance into their order, whose labours were subsidiary to those of the architect. But when the ambition or vanity of the Egyptian priests prompted them to erect huge and expensive fabrics, for celebrating the worship of their gods, or perpetuating the memory of their kings, they would naturally desire to participate in that scientific knowledge, which was possessed by the architects they employed; and as the sacerdotal order seldom fail, among a superstitious people, to gain the objects of their ambition, they would, in this case, succeed in their attempts, and be initiated into the mysteries, as well as instructed in the science of free masons. These remarks will not only assist us in discovering the source from which the Egyptian priests derived that knowledge for which they have been so highly celebrated; they will aid us also in accounting for those changes which were superinduced on the forms of free masonry, and for the admission of men into the order whose professions had no connection with the royal art. Masonry.

11. When the Egyptian priests had, in this manner, procured admission into the society of free masons, they connected the mythology of their country, and their metaphysical speculations, conceruing the nature of God and the condition of man, with an association formed for the exclusive purpose of scientific improvement, and produced that combination of science and theology which, in after ages, formed such a conspicuous part of the principles of free masonry.

12. The knowledge of the Egyptians was carefully concealed from the vulgar; and when the priests did condescend to communicate it to the learned men of other nations, it was conferred in symbols and hieroglyphics, accompanied with particular rites and ceremonies, marking the value of the gift they bestowed. What those ceremonies were, which were performed at initiation into the Egyptian mysteries, we are unable, at this distance of time, to determine. But as the Eleusinian and other mysteries had their origiu in Egypt, we may be able, perhaps, to discover the qualities of the fountain, by examining the nature of the stream.

The science and mysteries of the Egyptians carried into Greece.

13. The immense population of Egypt, conjoined with other causes, occasioned frequent emigrations from that enlightened country. In this manner it became the centre of civilization, and introduced into the most distant and savage climes the sublime mysteries of its religion, and those inventions and discoveries which originated in the ingenuity of its inhabitants. The first colony of the Egyptians that arrived in Greece, was conducted by Inachus, about 1970 years before the Christian era; and about three centuries afterwards, he was followed by Cecrops, Cadmus, and Danaus (G). The savage inhabitants of Greece beheld with astonishment the magical tricks of the Egyptians; and regarded as gods those skilful adventurers, who communicated

(G) Voyage du Jeune Anacharsis en Grece, 4to. tom. i. p. 2. Cecrops arrived in Attica in 1657 B. C. Cadmus came from Phenicia to Bœotia in 1593 B. C. and Danaus to Argolis in 1586 B. C.

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to them the arts and sciences of their native land (H). In this manner were sown those seeds of improvement, which, in future ages, exalted Greece to such pre-eminence among the nations.

Institution of the Eleusinian mysteries.

14. After the Egyptian colonies had obtained a secure settlement in their new territories, and were freed from those uneasy apprehensions which generally trouble the invaders of a foreign land, they instituted, after the manner of their ancestors, particular festivals or mysteries, in honour of those who had benefited their country by arts or by arms. In the reign of Erichthonius, (A. C. 1500), the mysteries of the Egyptian Isis were established at Eleusis under the name of the Eleusinia. They were instituted in honour of Ceres, who having come to Greece in quest of her daughter Proserpine, resided with Triptolemus at Eleusis, and instructed him in the knowledge of agriculture, and in the still more important knowledge of a future state (I).

Institution of the Panathenea and Dionysian mysteries.

15. About the same time, the Panathenea were instituted in honour of Minerva, and the Dionysian mysteries in honour of Bacchus, who invented theatres (K), and instructed the Greeks in many useful arts, but particularly in the culture of the vine (L). That the Eleusinian and Dionysian mysteries were intimately connected with the progress of the arts and sciences, is manifest from the very end for which they were formed; and that they were modelled upon the mysteries of Isis and Osiris, celebrated in Egypt, is probable from the similarity of their origin, as well as from the consent of ancient authors (M). If there be any plausibility in our former reasoning concerning the origin of knowledge in Egypt, it will follow, that the Dionysia and the mysteries of Eleusis, were, like the societies of free masons, formed for scientific improvement, though tinctured with the doctrines of the Egyptian mythology.

Resemblance between the Eleusinian and Dionysian mysteries.

Similarity between the Eleusinian mysteries and free masonry.

16. But it is not from conjecture only that this conclusion may be drawn. The striking similarity among the external forms of these secret associations, and the still more striking similarity of the objects they had in view, are strong proofs that they were only different streams issuing from a common fountain. Those who were initiated into the Eleusinian mysteries, were bound by the most awful engagements, to conceal the instructions they received, and the ceremonies that were performed (N). None were admitted as candidates, till they arrived at a certain age; and particular persons were appointed, to examine and prepare them for the rites of initiation (O). Those, whose conduct was found irregular, or who had been guilty of atrocious crimes, were rejected as unworthy of initiation; while the successful candidates were instructed, by significant symbols, in the principles of religion (P), were exhorted to quell every turbulent appetite and passion (Q), and to merit, by the improvement of their minds, and the purity of their hearts, those ineffable benefits which they were still to receive (R). Significant words were communicated to the members: grand officers presided over their assemblies (S): Their emblems were exactly similar to those of free masonry (T); and the candidate advanced from one degree to another, till he received all the lessons of wisdom and of virtue which the priests could impart (U). But besides these circumstances of resemblance, there are two facts, transmitted to us by ancient authors, which have an astonishing similarity to the ceremonies of the third degree of free masonry. So striking is the resemblance, that every brother of the order who is acquainted with them, cannot question, for a moment, the opinion which we have been attempting to support (X).

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17. Having thus mentioned some features of resemblance between the mysteries of Eleusis, and those of free masonry, let us now attend to the sentiments of contemporaries, respecting these secret associations, and we will find, that they have been treated with the same illiberality and insolence. That some men, who, from self-sufficiency, or unsocial dispositions, have refused to be admitted into these orders, should detract from the character of an association, which pretends to enlighten the learned, and expand the affections of narrow and contracted minds, is by no means a matter of surprise; and it is equally consistent with human nature, that those, whose irregular conduct had excluded them from initiation, should calumniate an order, whose blessings they were not allowed to participate, and whose honours they

The mysteries of Eleusis and of free masonry have experienced the same treatment from the uninitiated.

(H) Herodot. lib. i. cap. 58.

(I) Isocrates Paneg. tom. i. p. 132.

(K) Polydor Virg. de Rerum Invent. lib. iii. cap. 13.

(L) Robertson's Greece, p. 59. Bacchus or Dionysius came into Greece during the reign of Amphyctyon, who flourished about 1497 B. C.

(M) En adsum natura parens tuis Luci admota precibus summa numinum,—cujus numen unicum, multiformi specie, ritu vario, totus veneratur orbis. Me primogenii Phryges Pessinunticam nominant deûm matrem; hinc Autochtones Attici Cecropiam Minervam (alluding to the Panathenea): Illinc Cretes Dictynnam Dianam, &c. Eleusinii vetustam Deam Cererem; priscaque doctrina pollentes Egyptii, ceremoniis me prorsus propriis percolentes, appellant vero nomine reginam Isidem. L. Apuleii Metamorph. lib. xi.

(N) Andoc. de Myst. p. 7. Meursius in Eleus. Myst. cap. 20. This latter author has collected all the passages in ancient writers, about the Eleusinian mysteries.

(O) Hesychius in Ὑδραν.

(P) Clemens Alexand. Strom. lib. i. p. 325. lib. vii. p. 845.

(Q) Porphyr. ap. Stob. Eclog. Phys. p. 142.

(R) Arrian in Epictet. lib. iii. cap. 21. p. 440.

(S) Robertson's Greece, p. 127.

(T) Euseb. Prepar. Evangel. lib. iii. cap. 12. p. 117.

(U) Petav. ad Themist. p. 414. Anacharsis, tom. iii. p. 582.

(X) The brethren of the order may consult, for this purpose, the article ELEUSINIA, and Robertson's history of Ancient Greece, p. 127.

Masonry. they were prohibited to share. Men of this description represented the celebration of the Eleusinian mysteries, as scenes of riot and debauchery; and reproached the members of the association, that they were not more virtuous and more holy than themselves (Y). But it is the opinion of contemporary writers, that these rumours were completely unfounded, and arose from the silence of the initiated, and the ignorance of the vulgar. They even maintain, that the mysteries of Eleusis produced sanctity of manners, attention to the social duties, and a desire to be as distinguished by virtue, as by silence. See ELEUSINIA. The illustrious Socrates could never be prevailed upon to partake of these mysteries (Z); and Diogenes, upon receiving a similar solicitation, replied, "That Patrecion, a notorious robber, obtained initiation; and that Epaminondas and Agesilaus never desired it (A)." But did not these men know, that in all human societies, the virtuous and the noble must sometimes associate with the worthless and the mean? Did they not know that there often kneel in the same temple, the righteous and the profane; and that the saint and the sinner frequently officiate at the same altar? Thus did the philosophers of antiquity calumniate and despise the mysteries of Eleusis; and, in the same manner, have some philosophers of our own day, defamed the character, and questioned the motives of free masons.

Objection answered. 18. This similarity of treatment, which the mysteries of Ceres and free masonry have received, is no small proof of the similarity of their origin, and their object. To this conclusion, however, it may be objected, that though the points of resemblance between these secret societies are numerous, yet there were circumstances in the celebration of the Eleusinian mysteries, which have no counterpart in the ceremonies of free masonry. The sacrifices, purifications, hymns, and dances, which were necessary in the festival of Ceres, have, indeed, no place in the society of free masons. But these points of dissimilarity, instead of weakening, rather strengthen our opinion. It cannot be expected, that in the reign of Polytheism, just sentiments of the deity should be entertained; and much less, that the adherents of Christianity should bend their knees to the gods of the heathens. The ancients worshipped those beings, who conferred on them the most signal benefits, with sacrifices, purifications, and other tokens of their humility and gratitude. But when revelation had disclosed to man more amiable sentiments concerning the Divine Being, the society of free masons banished from their mysteries those useless rites, with which the ancient brethren of the order attempted to appease and requite their deities; and modelled their ceremonies upon this foundation, that there is but one God, who must be worshipped in spirit and in truth. Masonry.

19. The mysteries of Ceres were not confined to the city of Eleusis; they were introduced into Athens about 1356 B. C. (B); and, with a few slight variations, were observed in Phrygia, Cyprus, Crete, and Sicily (C). They had reached even to the capital of France (D); and it is highly probable that, in a short time after, they were introduced into Britain, and other northern kingdoms (E). In the reign of the emperor Adrian (F), they were carried into Rome, and were celebrated, in that metropolis, with the same rites and ceremonies which were performed in the humble village of Eleusis. They had contracted impurities, however, from the length of their duration, and the corruption of their abettors; and though the forms of initiation were still symbolical of the original and noble objects of the institution; yet the licentious Romans mistook the shadow for the substance; and, while they underwent the rites of the Eleusinian mysteries, they were strangers to the object for which they were framed. The mysteries of Eleusis were celebrated in several countries.

20. About the beginning of the fifth century, Theodosius the Great prohibited, and almost totally extinguished the Pagan theology in the Roman empire (G); and the mysteries of Eleusis suffered in the general devastation (H). It is probable, however, that these mysteries were secretly celebrated, in spite of the severe edicts of Theodosius; and that they were partly continued during the dark ages, though stripped of their original purity and splendour. We are certain, at least, that many rites of the Pagan religion were performed, under the dissembled name of convivial meetings, long after the publication of the emperor's edicts (I); and Psellus (K), informs us, that the mysteries of Ceres subsisted in Athens till the eighth century of the Christian era, and were never totally suppressed. Abolition of the Eleusinian mysteries in the reign of Theodosius.

 21. Having

(Y) Robertson's Greece, p. 127. Porphyr. de Abstinentia, lib. iv. p. 353. Julian orat. v. p. 173.

(Z) Lucian in Demonact. tom ii. p. 380.

(A) Plut. de aud. Poet. tom. ii. p. 21. Diog. Laert. lib. vi. § 39.

(B) Playfair's Chronology

(C) Lucii Apuleii Metamorph. lib. xi. p. 197, 198.

(D) Praise of Paris, or Sketch of the French capital, 1803, by S. West, F. R. S. F. A. S. This author observes, in the preface to his work, that Paris is derived from *Par Isis*, because it was built beside a temple dedicated to that goddess; that this temple was demolished at the establishment of Christianity, and that there remains to this day, in the Petits Augustins, a statue of Isis nursing Orus.

(E) Omitto Eleusinam sanctam illam et augustam, *ubi initiantur gentes orarum ultimæ*. Cic. de Nat. Deorum, lib. i. sub fine.

(F) A. D. 117. Encyclop. Brit. vol. vi. p. 555. Potter's Antiq. vol. i. p. 389.

(G) Gibbon's History of the Decline and Fall of the Roman Empire, 8vo. vol. v. p. 120.

(H) Zozim. Hist. lib. iv.

(I) Gibbon, vol. v. p. 110.

(K) In his treatise Περι δαιμονων ὁτι δοξασουσιν οι ἑλληνες, quoted by Mr Clinch in the Anthologia Hibernica, for January 1794, p. 36.

21. Having thus considered the origin and decline of the mysteries of Eleusis, and discovered in them numerous and prominent features of resemblance to those of free masonry; we may reasonably infer, that the Egyptian mysteries which gave rise to the former, had a still nearer affinity to the latter; and, from this conclusion, the opinions that were formerly stated, concerning the antiquity of the order, and the origin of Egyptian knowledge, will receive very considerable confirmation.

Origin and history of the Dionysian mysteries.

22. Let us now direct our attention to the Dionysia, or mysteries of Bacchus, which were intimately connected with those of Ceres, and, perhaps, still more with the mysteries of free masonry. Herodotus (L) informs us that the solemnities, in honour of Dionysius or Bacchus, were originally instituted in Egypt; and were transported from that country into Greece, by one Melampus. But not only did the mysteries of Ceres and Bacchus flow from the same source; the one was in some measure interwoven with the other, and it is almost certain, from what we are now to mention, that those who were initiated into the former, were entitled to be present at the celebration of the latter. The sixth day of the Eleusinian festival was the most brilliant of the whole. It received the appellation of Bacchus, because it was chiefly, if not exclusively, devoted to the worship of that god. His statue, attended by the initiated and the ministers of the temple, was conducted from Athens to Eleusis, with much pomp and solemnity (M). And after it had been introduced into the temple of Ceres, it was brought back to Athens with similar ceremonies. The connection between the Eleusinian and Dionysian mysteries is manifest, also, from the common opinion, that Ceres was the mother of Bacchus (N). And Plutarch assures us, that the Egyptian Isis was the prototype of Ceres; that Osiris was the same with Bacchus; and that the Dionysia of Greece was only another name for the Pamylia of Egypt (O). As Bacchus was the inventor of theatres, as well as of dramatical representations, that particular class of masons, who were employed in the erection of these extensive buildings, were called the Dionysian artificers (P), and were initiated into the mysteries of their founder, and consequently into those of Eleusis (Q). But, from the tendency of the human mind to embrace the ceremonial, while it neglects the substantial part of an institution, the Dionysian festival, in the degenerate ages of Greece, was more remarkable for inebriation and licentiousness, than for the cultivation of virtue and of science; and he who was at first celebrated as the inventor of arts, was afterwards worshipped as the god of wine. Those who were desirous of indulging secretly in licentious mirth and unhallowed festivity, cloaked their proceedings under the pretence of worshipping Bacchus; and brought disgrace upon those mysteries, which were instituted for the promotion of virtue, and the improvement of art.

The Bacchanalia unconnected with the Dionysian mysteries.

23. About 200 years B. C. an illiterate and licentious priest came from Greece to Tuscany, and instituted the Bacchanalia, or feast of the Bacchanals (R). From Tuscany they were imported to Rome; but the promoters of these midnight orgies having proceeded to the farthest extremity of dissipation and disloyalty, they were abolished throughout all Italy, by a decree of the senate (S). It has been foolishly supposed that the Bacchanalia were similar to the Diouysian mysteries, merely because they were both dedicated to Bacchus. The Liberalia of Rome was the festival corresponding to the Dionysia of Greece (T); and it is probable that this feast was observed throughout the Roman empire, till the abrogation of the Pagan theology in the reign of Theodosius. The opinion which an impartial inquirer would form, concerning the nature and tendency of the mysteries of Bacchus, would not be very favourable to the character of the institutiou. But it should be remembered that deviations from the intentions and form of any association, are no objection to the association itself. They are rather proofs of its original purity and excelleuce; as it is not from the paths of vice, but from those of virtue, that we are accustomted to stray.

The Liberalia were similar to the Dionysian mysteries.

24. Hitherto we have considered the Dionysian mysteries under an unpropitious aspect; let us now trace them in their progress from Europe to Asia, where they retained their primitive lustre, and effectually contributed to the rapid advancement of the fine arts.

In consequence of the Ionic migration, the Dionysian mysteries were established in Asia.

25. About 1000 years B. C. (U), the inhabitants of Attica, complaining of the narrowness of their territory, and the unfruitfulness of its soil, went in quest of more extensive and fertile settlements. Being joined by a number of the inhabitants of surrounding provinces, they sailed to Asia Minor, drove out the inhabitants, seized upon the most eligible situations, and united them under the name of Ionia, because the greatest number of the refugees were natives of that Grecian province (X). As the Greeks, prior to the Ionic migration,

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(L) Ελλησι γαρ δη Μελαμπους, εστι ὁ ηνησαμενος τω Διονυσω το τε ὀνομα και την θυσιην. Herodot. lib. ii. cap. 49.

(M) Anacharsis, tom. iii. p. 531. Plut. in Phoc. tom. i. p. 754. Meurs. in Eleus. cap. 27.

(N) Potter, vol. i. p. 393.

(O) De Iside et Osiride. Idèe du Gouvernment Ancien et Modern de l'Egypte, p. 26. Paris 1743.

(P) Διονυσιακοι τεχνιται. Aulus Gellius, lib. xx. c. 4.

(Q) Vid. Potter, vol. i. p. 41.

(R) Tit. Liv. lib. xxxix. cap. 8.

(S) Græcus ignobilis in Etruriam venit, *nulla cum arte earum quas multas ad animorum corporumque cultum nobis eruditissima omnium gens invexit*, sed sacrificulus et vatis.

(T) Liberalia (says Festus) liberi Festa, quæ apud Græcos dicuntur Dionysia. Vid. Universal History, vol. xiii. p. 262.

(U) Playfair places the Ionic migration in 1044 B. C. Gillies in 1055; and Barthelemy, the author of Anacharsis's Travels, in 1076.

(X) Herodotus, lib. i. cap. 142. Gillies's Hist. of Greece, 8vo. vol. p. 102.

Masonry. gration, had made considerable progress in the arts and sciences (Y), they carried these along with them into their new territories; and introduced into Ionia the mysteries of Minerva and Dionysius (Z), before they were corrupted by the licentiousness of the Athenians. In a short time the Asiatic colonies surpassed the mother-country in prosperity and science. Sculpture in marble, and the Doric and Ionian orders, were the result of their ingenuity (A). They returned even into Greece; they communicated to their ancestors the inventions of their own country; and instructed them in that style of architecture which has been the admiration of succeeding ages. For these improvements the world is indebted to the *Dionysian artificers*, an association of scientific men, who possessed the exclusive privilege of erecting temples, theatres, and other public buildings in Asia Minor (B). They supplied Ionia, and the surrounding countries, as far as the Hellespont, with theatrical apparatus by contract; and erected the magnificent temple at Teos, to Bacchus, the founder of their order (C). These artists were very numerous in Asia, and existed, under the same appellation, in Syria, Persia, and India (D). About 300 years before the birth of Christ a considerable number of them were incorporated, by command of the kings of Pergamus, who assigned to them Teos as a settlement, being the city of their tutelary god (E). The members of this association, which was intimately connected with the Dionysian mysteries, were distinguished from the uninitiated inhabitants of Teos, by the science which they possessed, and by appropriate words and signs, by which they could recognize their brethren of the order (F.) Like free masons they were divided into lodges, which were distinguished by different names (G). They occasionally held convivial meetings in houses erected and consecrated for this purpose; and each separate association was under the direction of a master, and presidents or wardens (H). They held a general meeting once a-year, which was solemnized with great pomp and festivity; and at which the brethren partook of a splendid entertainment, provided by the master, after they had finished the sacrifices to their gods, and especially to their patron Bacchus (I). They used particular utensils in their ceremonial observances; some of which were exactly similar to those that are employed by the fraternity of free masons (K). And the more opulent artists were bound to provide for the exigencies of their poorer brethren (L). The very monuments which were reared by these masons, to the memory of their masters and wardens, remain to the present day in the Turkish burying grounds, at Siverhissar and Eraki (M). The inscriptions upon them express, in strong terms, the gratitude of the fraternity, for their disinterested exertions in behalf of the order; for their generosity and benevolence to its individual members; for their private virtues, as well as for their public conduct. From some circumstances which are stated in these inscriptions, but particularly from the name of one of the lodges, it is highly probable, that Attalus, king of Pergamus, was a member of the Dionysian fraternity. Masonry.

History of the Dionysian artificers.

Their resemblance to free masons.

26. Such is the nature of that association of architects, who erected those splendid edifices in Ionia, whose ruins even afford us instruction, while they excite our surprise. If it be possible to prove the identity of any two societies, from the coincidence of their external forms, we are authorised to conclude, that the fraternity of the Ionian architects, and the fraternity of free masons, are exactly the same; and as the former practised the mysteries of Bacchus and Ceres, several of which we have shown to be similar to the mysteries of masonry; we may safely affirm, that, in their internal, as well as external procedure, the society of free masons resembles the Dionysiacs of Asia Minor (N).

27. The

(Y) According to the author of Anacharsis's Travels, the arts took their rise in Greece about 1547, B. C.

(Z) Chandler's Travels in Asia Minor, p. 100, 4to. 1775. The Panathenea and the Dionysian mysteries were instituted about 300 years before the Ionic migration.

(A) Gillies's Hist. Ant. Greece, vol. ii. p. 162.

(B) Strabo, lib. iv. Chishull Antiquitates Asiaticæ, p. 107. Robison's Proofs of a Conspiracy, p. 20.

(C) Ionian Antiquities, published by the Society of Dilettanti, p. 4. Strabo, lib. iv. Chishull Antiq. Asiat. p. 139.

(D) Και τω Διονυσω την Ασιαν ὁλην καθιερωσαντες μεχρι της Ινδικης. Strabo, p. 471. Ionian Antiquities, p. 4.

(E) Chandler's Travels, p. 100. Chishull Antiq. Asiat. p. 138. Ionian Antiquities, p. 4.

(F) Robison's Proofs of a Conspiracy, p. 20.

(G) One of these lodges was denominated Κοινὸν των Ατταλιςων, i. e. Commune Attalistarum; and another Κοινον της Εχινη Συμμοριας, i. e. Commune Sodalitii Echini. Chishull, p. 139.

(H) See the two decrees of these artists preserved by Chishull, p 138—149. The place where they assembled is called συνοικια, contubernium; and the society itself, sometimes συναγωγη, collegium; ἀιρεσις, secta; συνοδος, synodus; κοινος, communitas. See Aulus Gellius, lib. viii. cap. xi.

(I) Chandler's Travels, p. 103.

(K) See the decree of the Attalists in Chishull, particularly the passages at the bottom of p. 141, 142; ἀπαλιπειν δε και τα προς ευσχημοσιν εν τω τεμενει χρηστηρια ικανα, i. e. in delubro etiam, ultra ea quae ornamento erant, non pauca utensilia reliquit.

(L) Chishull, p. 140.

(M) Chandler's Travels, p. 100. These monuments were erected about 150 years B. C. The inscriptions upon them were published by Edmund Chishull, in 1728, from copies taken by Consul Sherard in 1709, and examined in 1716. Ionian Antiquities, p. 3.

(N) Dr Robison, who will not be suspected of partiality to free masons, ascribes their origin to the Dionysian artists.

Masonry.

The existence of free masonry at the building of Solomon's temple not improbable.

27. The opinion, therefore, of free masons, that their order existed and flourished at the building of Solomon's temple, is by no means so pregnant with absurdity as some men would wish us to believe. We have already shown, from authentic sources of information, that the mysteries of Ceres and Bacchus were instituted about 400 years before the reign of Solomon (O); and there are strong reasons for believing, that even the association of the Dionysian architects existed before the building of the temple. It was not, indeed, till about 300 years before the birth of Christ, that they were incorporated at Teos, under the kings of Pergamus; but it is universally allowed, that they arose long before their settlement in Ionia, and, what is more to our present purpose, that they existed in the very land of Judea (P). It is observed by Dr Robison (Q), that this association came from Persia into Syria, along with that style of architecture which is called Grecian: And since we are informed by Josephus (R), that that species of architecture was used at the erection of the temple; there is reason to infer, not only that the Dionysiacs existed before the reign of Solomon, but that they assisted this monarch in building that magnificent fabric, which he reared to the God of Israel. Nothing, indeed, can be more simple and consistent than the creed of the fraternity, concerning the state of their order at this period. The vicinity of Jerusalem to Egypt; the connection of Solomon with the royal family of that kingdom (S); the progress of the Egyptians in architectural science; their attachment to mysteries and hieroglyphic symbols; and the probability of their being employed by the king of Israel, are additional considerations, which corroborate the sentiments of free masons, and absolve them from those charges of credulity and pride with which they have been loaded.

Objection answered.

28. To these opinions, it may be objected, that if the fraternity of free masons flourished during the reign of Solomon, it would have existed in Judea in after ages, and attracted the notice of sacred or profane historians. Whether or not this objection is well founded, we shall not pretend to determine; but if it can be shown, that there did exist, after the building of the temple an association of men, resembling free masons, in the nature, ceremonies, and object of their institution; the force of the objection will not only be taken away, but additional strength will be communicated to the opinion which we have been supporting. The association here alluded to, is that of the Essenes, whose origin and sentiments have occasioned much discussion among ecclesiastical historians. They are all of one mind, however, respecting the constitution and observances of this religious order.

Masonry.

History of the Essenes.

29. When a candidate was proposed for admission, the strictest scrutiny was made into his character (T). If his life had hitherto been exemplary; and if he appeared capable of regulating his conduct according to the virtuous though austere maxims of their order, he was presented at the expiration of his noviciate, with a white garment, as an emblem of the correctness of his conduct and the purity of his heart (U). A solemn oath was then administered to him, that he would never, even at the risk of his life, divulge the mysteries of the order; that he would make no innovations on the doctrines of the society; and that he would continue in that honourable course of piety and virtue which he had begun to pursue (X). Like free masons, they instructed the young member in the knowledge which they derived from their ancestors (Y). They admitted no women into their order (Z). They had particular signs for recognizing each other, which have a strong resemblance to those of free masons (A). They were divided into separate lodges or colleges (B). They had different places of meeting, where they practised their rites, and settled the affairs of the society; and, after the performance of these duties, they assembled in a large hall, where an entertainment was provided for them by the president, or master of the college, who allotted a certain quantity of provisions to every individual (C). They abolished all distinctions of rank; and, if preference was ever given, it was given to piety, liberality, and virtue (D). Stewards were appointed in every town, to supply the wants of indigent strangers (E). The Essenes pretended to higher degrees of piety and knowledge, than the uninitiated vulgar; and though their pretensions were high, they were never questioned by their enemies. Austerity of manners was one of the chief characteristics of the Essenian fraternities;

(O) According to Playfair's Chronology, the temple of Solomon was begun in 1016, and finished in 1008, B. C. The Eleusinian mysteries were introduced into Athens in 1356 B. C. a considerable time after their institution.

(P) Robison's Proofs of a Conspiracy, p. 20.

(Q) Proofs of a Conspiracy, p. 20, 21.

(R) Jewish Antiquities, book viii. chap. v.

(S) Josephus's Jewish Antiquities, book viii. chap. ii.

(T) Joseph. de Bello Judaico, lib. ii. cap. 1.

(U) Id. id.

(X) Id. id.

(Y) Philo de Vita Contemplativa, apud opera, p. 691.

(Z) Basnage, b. ii. ch. 13. § 8.

(A) Basnage, b. ii. ch. 12. § 26. Id. id. § 22.

(A) In order to be convinced of this, our brethren of the order may consult some of the works already quoted; particularly, Philo's Treatise de Vita Contemplativa, apud opera, p. 691.

(B) Basnage, b. iii. c. 12. § 14. vid. opera Philonis, p. 679. When Philo, in his Treatise entitled "Quod omnis probus Liber," is describing the society of the Essenes, he employs the same terms to denote the association itself, and their places of meeting, which are used in the decree of the Dionysians already mentioned. Vide Philo de Vita Contemplativa, p. 691.

(C) Joseph. de Bello Judaico, lib. ii. cap. 1.

(D) Id. id. § 20, 22. Philonis Opera, p. 678.

(E) Basnage, b. iii. c. 12. § 20. chap. 13. § 1.

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ties: They frequently assembled, however, in convivial parties; and relaxed for a while the severity of those duties which they were accustomed to perform (F). This remarkable coincidence between the chief features of the masonic and Essenian fraternities, can be accounted for only by referring them to the same origin. Were the circumstances of resemblance either few or fanciful, the similarity might have been merely casual. But when the nature, the object, and the external forms of two institutions, are precisely the same, the arguments for their identity are something more than presumptive. There is one point, however, which may, at first sight, seem to militate against this supposition. The Essenes appear to have been in no respects connected with architecture, nor addicted to those sciences and pursuits which are subsidiary to the art of building. That the Essenes directed their attention to particular sciences, which they pretended to have received from their fathers, is allowed by all writers; but, whether or not these sciences were in any shape connected with architecture, we are, at this distance of time, unable to determine. Be this as it may, uncertainty upon this head, nay, even an assurance that the Essenes were unconnected with architectural science, will not affect the hypothesis which we have been maintaining. For there have been, and still are, many associations of free masons, where no architects are members, and which have no connection with the art of building. But if this is not deemed a sufficient answer to the objection, an inquiry into the origin of the Essenes will probably remove it altogether, while it affords additional evidence, for the identity of the masonic and Essenian associations.

The Essenes originated from the Kasideans, who were bound to preserve the temple of Jerusalem.

30. Sacred and profane historians have entertained different opinions concerning the origin of the Essenes. They all agree, however, in representing them as an ancient association, originating from particular fraternities, which formerly existed in the land of Judea (G). Pliny refers them to such a remote antiquity (H) that they must have existed during the reign of Solomon; and even Basnage, who is the only writer that seems disposed to consider them as a recent association, confesses that they existed under Antigonus, about 300 years before the Christian era (I). Scaliger contends, with much appearance of truth, that the Essenes were descended from the Kasideans, who make such a conspicuous figure in the history of the Maccabees (K). The Kasideans were a religious fraternity, or an order of the *Knights of the Temple of Jerusalem*, who bound themselves to adorn the porches of that magnificent structure, and to preserve it from injury and decay (L). This association was composed of the greatest men of Israel, who were distinguished for their charitable and peaceful dispositions (M); and always signalized themselves by their ardent zeal for the purity and preservation of the temple (N). From these facts it appears, that the Essenes were not only an ancient fraternity, but that they originated from an association of architects, who were connected with the building of Solomon's temple. Nor was this order confined to the Holy Land. Like the fraternities of the Dionysiacs and free masons, it existed in all parts of the world (O); and though the lodges in Judea were chiefly, if not wholly, composed of Jews, yet the Essenes admitted into their order men of every religion, and every rank in life (P). They adopted many of the Egyptian mysteries (Q); and, like the priests of that country, the magi of Persia, and the gymnosophists in India, they united the study of moral with that of natural philosophy (R). Although they were patronized by Herod, and respected by all men for the correctness of their conduct, and the innocence of their order (S), they suffered severe persecutions from the Romans, till their order was abolished, about the middle of the fifth century (T); a period extremely fatal to the venerable institutions of Egypt, Greece, and Rome.

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Institution of Pythagoras at Crotona.

31. Connected with the Essenian and Masonic fraternities, was the institution of Pythagoras at Crotona. After this philosopher, in the course of his travels through Egypt, Syria, and Ionia, had been initiated into the mysteries of these enlightened kingdoms, he imported into Europe the sciences of Asia, and offered to the inhabitants of his native soil, the important benefits which he himself had received (U). The offers of the sage having been rejected by his countrymen of Samos (X), he settled at Crotona, in Italy, where more respect was paid to his person, and more attention to his precepts (Y). When the kindness of the Crotonians, and their solicitude to obtain scientific information, had inspired Pythagoras with some hopes of success, he selected a number of his disciples, who from the similarity of their characters, the mildness of their dispositions, and the steadiness of their conduct, seemed best adapted for forwarding the purposes he had in view (Z). These he formed into a fraternity, or separate order of men, whom

(F) Dicam aliquid de sodalitiis eorum, quoties hilarius convivia celebrant. Philonis opera, p. 692.

(G) Gale's Court of the Gentiles, part ii. book ii. chap. 6. p. 147. Serrarii Trihæres. lib. iii. cap. ii. Vid. etiam Basnage, b. ii. ch. 12. § 4.; and Pictet. Theolog. Chret. tom. iii. part. iii. p. 106.

(H) Plin. lib. v. cap. 17. Vid. etiam Solinum, c. 35. p. 43. edit. Salmasii; and art. ESSENES.

(I) Basnage, book ii. chap. ii. § 8. Pictet. Theolog. Chret. tom. iii. part. iii. p. 107.

(K) Scaliger de Emend. Temp.

(L) Scaliger Elench. Trihæresii Nicolai Serrarii, cap. 22. p. 441.

(M) 1 Maccabees, vii. 13.

(N) Scaliger ut supra.

(O) Basnage, b. ii. chap. 13. § 4.

(P) Id. Id. chap. 12. § 20. compared with chap. 13. § 4.

(Q) Id. Id. chap. 12. § 24.

(R) Philo's Treatise, entitled, "Quod omnis probus Liber," apud Opera, p. 678.

(S) Id. Id. chap. 12. § 13, 25.

(T) Basnage, b. ii. chap. 12. § 25, 26.

(U) Pythagoras returned from Egypt about 560 years before Christ.

(X) Jamblichus de vita Pythagoræ, part i. cap. 5. p. 37.

(Y) Id. Id. cap. 6. p. 42, 43.

(Z) Gillies's History of Ancient Greece, vol. ii. p. 27.

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whom he instructed in the sciences of the east (A), and to whom he imparted the mysteries and rites of the Egyptian, Syrian, and Ionian associations. Before any one was received into the number of his disciples, a minute and diligent enquiry was made into his temper and character (B). If the issue of this inquiry was favourable to the candidate, he bound himself by a solemn engagement, to conceal, from the uninitiated, the mysteries which he might receive, and the sciences in which he might be instructed (C). The doctrines of charity, of universal benevolence, and especially of affection to the brethren of the order, were warmly recommended to the young disciples (D); and such was the influence which they had upon their minds, that discord seemed to have been banished from Italy (E) and the golden age to have again returned. Strangers of every country, of every religion, and of every rank in life, were received, if properly qualified, into the Pythagorean association (F). Like free masons they had particular words and signs, by which they might distinguish each other, and correspond at a distance (G). They wore white garments as an emblem of their innocence (H). They had a particular regard for the east (I). They advanced from one degree of knowledge to another (K). They were forbidden to commit to writing their mysteries, which were preserved solely by tradition (L). The Pythagorean symbols and secrets were borrowed from the Egyptians, the Orphic and Eleusinian rites, the Magi, the Iberians, and the Celts (M). They consisted chiefly of arts and sciences, united with theology and ethics, and were communicated to the initiated in cyphers and symbols (N). An association of this nature, founded upon such principles, and fitted for such ends, did not remain long in obscurity. In a short time it extended over the kingdoms of Italy and Sicily, and was diffused even through ancient Greece, and the islands of the Egean sea (O). Like other secret societies, it was vilified by malicious men, who were prohibited from sharing its advantages, from the weakness of their minds and the depravity of their hearts (P.) Chagrined with disappointment, and inflamed with rage, they often executed vengeance upon the innocent Pythagoreans, and even set fire to the lodges in which they were assembled (Q). But the disciples of the sage persisted in that honourable cause in which they had embarked; and, though the persecution of their enemies drove them from their native land, they still retained for each other the sympathy of brothers, and often suffered death in its most agonizing form, rather than violate the engagements into which they had entered (R). An attempt, like this, against the society of free masons, has been witnessed in our own day. It has not, indeed, proceeded to such an extremity of violence. The spirit of extirpation, however, existed in sentiment, though it had not the courage to display itself in action. Disaffection to government, and disrespect to religion, were charged upon them with all the confidence of truth: And, had the governments of Europe been weak enough to credit the fancies of a few political enthusiasts, their subjects might, at this moment, have been armed against each other, and the nations of the world embroiled in discord.

Resemblance between the Pythagoreans and free masons.

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32. From these observations, it is manifest, that the Pythagorean and Masonic institutions were similar in their external forms, as well as in the objects which they had in view; and that both of them experienced, from contemporaries, the same unmerited reproach. Mr Clinch, in his Essays on Free Masonry (S) has enumerated, at great length, all the points of resemblance between these two institutions. He attempts to prove, that free masonry took its rse from the Pythagorean fraternity; but though he has been successful in pointing out a remarkable coincidence between these associations, he has no authority for concluding that the former originated from the latter. In a masonic manuscript, preserved in the Bodleian library, in the handwriting of King Henry VI. it is expressly said, that Pythagoras learned masonry from Egypt and Syria, and from those countries where it had been planted by the Phenicians; that the Pythagoreans carried it into France; and that it was, in the course of time, imported from that country into England (T). This, indeed, is no direct proof of our opinion; it shews us, at least, that the same sentiments have been entertained about four hundred years ago by the fraternity in England. It has been supposed by some philosophers

(A) Aulus Gellius lib. i. cap. 9. Gillies, vol. ii. p. 27.
(B) Jamblichus de vita Pythagoræ, cap. 17. p. 76. Gillies, vol. iii. p. 27.
(C) Jamblichus, cap. 23. p. 104.
(D) Id. cap. 8. p. 53. cap. 33. p. 193. cap. 6. p. 43. cap. 23. p. 102. Basnage's History of the Jews, b. ii. cap. 13. § 21. Anthologia Hibernica for March 1794, p. 181.
(E) Jamblichus, cap. 7. p. 46.
(F) Gillies, vol. ii. p. 28. Jamblichus, cap. 33. p. 202.
(G) Gilles, vol. ii. p. 27. Anthologia Hibernica for March 1794, p. 181.
(H) Basnage, b. ii. cap. 13. § 21. Anthologia Hibernica for March 1794, p. 183.
(I) Basnage b. ii. cap. 13. § 21. (K) Jamblichus, cap. 17. p. 72.
(L) Jamblichus, part i. cap. 32, p. 191.
(M) Warburton's Divine Legation of Moses, book iii. sect. 3. vol. 2. p. 132, 133. Jamblichus, cap. 8. p. 139. Gillies, vol. ii. p. 27.
(N) Jamblichus, cap. 8. p. 139. Gillies ut supra.
(O) Gillies, vol. ii. p. 28. Jamblichus, cap. 35. p. 207. (P) Id. Id. p. 200.
(Q) Jamblichus, p. 208. et seq. (R) Id. Id. chap. 32. p. 189
(S) Published in the Anthologia Hibernica for 1794.
(T) Lives of Leland, Hearne, and Wood, Oxford, 1772. Appendix to the life of Leland, N° vii. A copy of this manuscript may be seen in every work on free masonry.

Masonry. phers (U), that Pythagoras derived his mysteries chiefly from the Essenes, who were at that time much respected and very numerous in Egypt and Syria. The wonderful similarity, indeed, between these societies, both in the forms which they had in common with free masonry, and in those lesser customs and ceremonies, which were peculiar to themselves, render such a supposition extremely probable. It is remarked by all ecclesiastical historians, that the Essenes were Pythagoreans, both in discipline and doctrine (X); without every considering that the former existed some hundred years before the birth of Pythagoras (Y). The Pythagoreans, therefore, were connected with the Essenes, and the Essenes with the Kasideans, who engaged to preserve and adorn the temple of Jerusalem.

Objection answered. 33. There is one objection to the view which we have taken of this subject, which, though it has already been slightly noticed, it may be necessary more completely to remove. Although it will be acknowledged by every unbiassed reader, that free masonry has a wonderful resemblance to the Eleusinian and Dionysian mysteries, the fraternity of Ionian architects, and the Essenian and Pythagorean associations; yet some may be disposed to question the identity of these institutions, because they had different names, and because some usages were observed by one, which were neglected by another. But these circumstances of dissimilarity arise from those necessary changes, which are superinduced upon every institution, by a spirit of innovation, by the caprice of individuals, and by the various revolutions in civilized society. Every alteration or improvement in philosophical systems, or ceremonial institutions, generally produces a corresponding variation in their name, deduced from the nature of the improvement, or from the name of the innovator. The different associations for example, whose nature and tendency we have been considering, received their names from circumstances merely casual, and often of trifling consideration; though all of them were established for the same purpose, and derived from the same source. When the mysteries of the Essenes were imported by Pythagoras into Italy, without undergoing much variation, they were there denominated the mysteries of Pythagoras; and in our own day, they are called the secrets of free masonry, because many of their symbols are derived from the art of building, and because they are believed to have been invented by an association of architects, who were anxious to preserve, among themselves, the knowledge which they had acquired (Z). The difference in the ceremonial observances of these institutions may be accounted for nearly upon the same principles. From the ignorance, or superior sagacity of those who presided over the ancient fraternities, some ceremonies would be insisted upon more than others, some of less moment would be exalted into consequence, while others of greater importance would be depressed into obscurity. In process of time, therefore, some trifling changes would be effected upon these ceremonies, some rites abolished, and some introduced. The chief difference, however, between the ancient and modern mysteries, is, in these points which concern religion. But this arises from the great changes which have been produced in religious knowledge. It cannot be supposed that the rites of the Egyptian, Jewish, and Grecian religions, should be observed by those who profess only the religion of Christ; or that we should pour out libations to Ceres and Bacchus, who acknowledge no heavenly superior, but the true and the living God. Masonry.

Objection of Barruel's answered. 34. It may be proper here to take notice of an objection urged by M. Barruel, against the opinion of those, who believe that the mysteries of free masonry are similar to the mysteries of Egypt and Greece (A). From the unfairness with which this writer has stated the sentiments of his opponents on this subject; from the confidence and triumph with which he has proposed his own; and, above all, from the disingenuity with which he has supported them, many inattentive readers may have been led to adopt his notions, and to form as despicable an idea of the understandings as he would wish them to form of the character of masons. He takes it for granted, that all who embrace the opinion which we have endeavoured to support, must necessarily believe, that a unity of religious sentiments, and moral precepts, was maintained in all the ancient mysteries; and that the initiated entertained just notions of the unity of God, while the vulgar were addicted to the grossest polytheism. Upon this gratuitous supposition, which we completely disavow, because it has no connection with our hypothesis, does Barruel found all his declamations against the connection of our order with the Pythagorean and Eleusinian institutions. If this supposition, indeed, were true, his opinion would be capable of proof. But he is all the while combating the dogmas of Warburton, while he thinks he is overturning the antiquity of our order. There is perhaps in no language such a piece of downright sophistry as this portion of Barruel's work. He seems to scruple at no method, however base or dishonourable, that can bring discredit upon free masonry, and every thing connected with it. After having overturned the opinion of Warburton, he then attacks us on our ground, and stiles us the children of sophistry, deism, and pantheism, who deduce our origin from associations of men that were enemies to Christianity (B), and followed no guide but the light of nature. But this writer should recollect, that the son is not accountable for the degeneracy of his parents; and, if the ancient mysteries were the nurseries of such dangerous opinions, as this writer, in opposition

(U) Faydit Lettre, Nouvelles de la Republique des Lettres, Octobre 1703, p. 472.

(X) Gregory's Church History, vol. i. cent. 1.

(Y) Pliny, book 5. cap 17. Solinus, cap. 35. p. 43.

(Z) Symbols derived from the art of building, were also employed by the Pythagoreans, for conveying instruction to those who were initiated into their fraternity. Vid. Proclus in Euel. lib. xi. def. 2. &c.

(A) Memoirs of Jacobinism, vol. ii. p. 355—360.

(B) Vid Barruel, vol. ii. p. 357. I do not find in any system of chronology, that Christianity existed in the time of Pythagoras, or at the establishment of the Eleusinian mysteries!

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tion to authentic history, lays to their charge, it is to the glory of their posterity, that they have shaken off the yoke, and embraced that heavenly light which their ancestors affected to despise.

Modern history of free masonry.

35. Having finished what may be properly denominated the ancient history of free masonry, we are now to trace its progress from the abolition of the heathen rites, in the reign of Theodosius, to the present day; and, though the friends and enemies of the order seem to coincide in opinion upon this part of its history, the materials are as scanty as before, and the incidents equally unconnected. In those ages of ignorance and disorder which succeeded the destruction of the Roman empire, the minds of men were too much debased by superstition, and contracted by bigotry, to enter into associations for promoting mental improvement and mutual benevolence. The spirit which then raged, was not a spirit of inquiry. The motives which then influenced the conduct of men, were not those benevolent and correct principles of action which once distinguished their ancestors, and which still distinguish their posterity. Sequestered habits and unsocial dispositions characterized the inhabitants of Europe, in this season of mental degeneracy; while free masons, actuated by very different principles, inculcate on their brethren the duties of social intercourse, and communicate to all within the pale of their order, the knowledge which they possess and the happiness which they feel. But, if science had existed in these ages, and if a desire of social intercourse had animated the minds of men, the latter must have languished for want of gratification, as long as the former was imprisoned within the walls of a convent, by the tyranny of superstition, or the jealousy of power. Science was in these days synonymous with heresy; and had any bold and enlightened man ventured upon philosophical investigations, and published his discoveries to the world, he would have been regarded by the vulgar as a magician, and punished as a heretic by the church of Rome. These remarks may be exemplified and confirmed by an appropriate instance of the interfering spirit of the Romish church, even in the sixteenth century, when learning had made considerable advancement in Europe. The celebrated Baptista Porta having, like the sage of Samos, travelled into distant countries for scientific information, returned to his native home, and established a society which he denominated the academy of secrets. He communicated the information which he had collected to the members of this association; who, in their turn, imparted to their companions the knowledge which they had individually obtained. But this little fraternity, advancing in respectability and science, soon trembled under the rod of ecclesiastical oppression; and experienced in its dissolution, that the Romish hierarchy was determined to check the ardour of investigation, and retain the human mind in its former fetters of ignorance and superstition. How then could free masonry flourish, when the minds of men had such an unfortunate propensity to monkish retirement, and when every scientific and secret association was overawed and persecuted by the rulers of Europe?

The academy of secrets established by Baptista Porta.

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36. But, though the political and intellectual condition of society was unfavourable to the progress of free masonry; and, though the secret associations of the ancients were dissolved in the fifth century, by the command of the Roman emperor, yet there are many reasons for believing that the ancient mysteries were observed in private, long after their public abolition, by those enemies of Christianity who were still attached to the religion of their fathers. Some authors (c) even inform us, that this was actually the case, and that the Grecian rites existed in the eighth century, and were never completely abolished, (Art. 20.). These considerations enable us to connect the heathen mysteries, with that trading association of architects, which appeared, during the dark ages, under the special authority of the see of Rome.

It is probable that the ancient mysteries were observed privately after their abolition.

Trading association of architects during the dark ages.

37. The insatiable desire for external finery, and gaudy ceremonies, which was displayed by the catholic priests in the exercise of their religion, introduced a corresponding desire for splendid monasteries, and magnificent cathedrals. But as the demand for these buildings was urgent, and continually increasing, it was with great difficulty that artificers could be procured, even for the erection of such pious works. In order to encourage the profession of architecture, the bishops of Rome, and the other potentates of Europe, conferred on the fraternity of free masons the most important privileges; and allowed them to be governed by laws, customs and ceremonies, peculiar to themselves. The association was composed of men of all nations, of Italian, Greek, French, German, and Flemish artists, who were denominated free masons, and who, ranging from one country to another, erected those elegant churches and cathedrals, which, though they once gratified the pride and sheltered the rites of a corrupted priesthood, now excite the notice of antiquarians, and administer to the grandeur of kingdoms. The government of this association was remarkably regular. Its members lived in a camp of huts, reared beside the building in which they were employed. A surveyor, or master, presided over and directed the whole. Every tenth man was called a warden, and overlooked those who were under his charge; and such artificers as were not members of this fraternity, were prohibited from engaging in those buildings which free masons alone had a title to rear (D). It may seem strange, and perhaps inconsistent with what we have already said, that the fraternity of free masons should have been sanctioned, and even protected by the bishops of Rome. Secret associations, indeed, are always a terror to temporal and spiritual tyranny. But the church of Rome, instead of approving of the principles of free masonry, by the encouragement and patronage which they gave to architects, only employed them as instruments for gratifying their vanity, and satiating their ambition. For in after ages, when masons were more numerous, and when the demand for religious structures was less urgent than before, the bishops of Rome deprived the fraternity of those

(c) Gibbon, 8vo. vol. v. p. 110.

(D) Wren's Parentalia, or a History of the Family of Wren, p. 306, 307. Henry's History of Great Britain, vol. viii. p. 273. b. iv. chap. 5. § 1. Robison's Proofs of a Conspiracy, p. 21.

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Introduction of free masonry into Scotland. 38. Wherever the catholic religion was taught, the meetings of free masons were sanctioned and patronized. The principles of the order were even imported into Scotland (E), where they continued, for many ages, in their primitive simplicity, long after they had been extinguished in the continental kingdoms. In this manner, Scotland became the centre from which these principles again issued, to illuminate, not only all the nations on the continent, but every civilized portion of the habitable world. What those causes were which continued the societies of free masons longer in Britain than in other countries, it may not, perhaps, be easy to determine; but as the fact itself is unquestionable, it must have arisen, either from some favourable circumstances in the political state of Britain, which did not exist in the other governments of Europe; or from the superior policy, by which the British masons eluded the suspicion of their enemies, and the superior prudence with which they maintained the primitive simplicity and respectability of their order. The former of these causes, had, without doubt, a considerable share, in producing the effect under consideration; and we know for certain, that, in our own days, the latter has preserved free masonry in a flourishing condition throughout these united kingdoms, while, in other countries, the imprudence and foolish innovations of its members, have exposed it to the severest and justest censure, and, in many cases, to the most violent persecutions. It is a fact, requiring no confirmation, and resulting from the most obvious causes, that free masonry never flourishes in seasons of public commotion; and even in Great Britain, though the seat of war is commonly in foreign countries, it has universally declined. But in those lands which are the theatre of hostilities, it will be neglected in a still greater degree; and, if these hostilities are long continued, or frequently recur, the very name and principles of the order must be soon extinguished. Amid those continual wars, therefore, which, during the middle ages, distracted and desolated the continent of Europe, the association of architects would be soon dissolved; while in the humble village of Kilwinning, on the western coast of Scotland, they found a safe retreat from the violent convulsions of continental wars.

Connection between free masons and the knights templars. 39. Before we detail the progress of free masonry, after its importation into Britain, it will be necessary to give some account of the knights templars, a fraternity of free masons whose affluence and virtues often raised the envy of contemporaries, and whose unmerited and unhappy end must have often excited the compassion of posterity. It would be needless labour to enter into any investigation, in order to prove, that the order of the knights templars was a branch of free masonry. This fact has been invariably acknowledged by free masons themselves; and none have been more zealous to establish it than the enemies of their order (F). The former have admitted the fact, not because it was creditable to them, but because it was true; and the latter have supported it, because by the aid of a little sophistry, it might be employed to disgrace their opponents. Masonry.

History of the knights templars. 40. The order of the knights templars was instituted during the crusades, in the year 1118, by Hugo de Paganis, and Geoffrey of St Omers. It received this appellation because its members originally resided near the church in Jerusalem, which was dedicated to our Saviour. Though the professed object of this religious association was to protect those Christian pilgrims, whose mistaken piety had led them to the holy city; yet it is almost beyond a doubt, that its chief and primary intention, was to practise and preserve the rites and mysteries of masonry. We know at least, that the knights templars, not only possessed the mysteries, but performed the ceremonies, and inculcated the duties of free masons; and it is equally certain, that the practising of these rites could contribute nothing to the protection and comfort of the Catholic pilgrims. Had the templars publicly avowed the real object of their institution, instead of that favour which they so long enjoyed, they would have experienced the animosity of the church of Rome. But as they were animated with a sincere regard for the Catholic religion, and with a decided abhorrence for the infidel possessors of Judea, it was never once suspected that they transacted any other business at their secret meetings, but that which concerned the regulation of their order, the advancement of religion, and the extirpation of its enemies. The many prodigies of valour which they exhibited against the infidels; the many charitable deeds which they performed towards the distressed pilgrims; and the many virtues which adorned their private character, procured them, from the rulers of Europe, that respect and authority to which they were so justly entitled, and which they so long maintained. But respect and authority were not the only rewards which they purchased by their virtues and military prowess. From the munificence of the popes, the generosity of the pious princes and nobles of Europe, and from the gratitude of those opulent pilgrims, who, in the moments of distress, had experienced their kind assistance, the knights templars had acquired such immense possessions in every kingdom of Europe, but particularly in France, that their revenues often exceeded those of the secular princes. Thus independent in their circumstances, and being fatigued with those unsuccessful struggles against the infidels, which they had maintained with such manly courage, they returned to their native land to enjoy,

(E) A. D. 1140. *Vid.* Statistical account of Scotland, vol. xi. Parish of Kilwinning; or Edinburgh Magazine for April 1802, p. 243.

(F) *Vid.* Barruel's Memoirs of Jacobinism, vol. ii. p. 379—383. where this is attempted at some length. As Barruel, however, was unacquainted with the observances of the templars and masons, he has attributed to both many absurd rites which probably never existed but in his own mind. For the same reason he has omitted many points of resemblance which would have established the common opinion upon an immoveable foundation.

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in peace and quiet, the recompense of their toils. But, like all men who are suddenly transported from danger and fatigue, to opulence and ease, many of the templars deviated from that virtuous coorse which they had hitherto pursued, and indulged too freely in those luxuries and fashionable amusements to which they were invited by opulence, and impelled by inactivity. Thus, from the indiseretions of a few, did the knights templars lose a considerable share of those honours, and that celebrity, which they had long enjoyed. But this relaxation of discipline, and attachment to luxurious indolence, were the only crimes of which the templars were guilty; and to men of honour and spirit like them, the forfeiture of popularity, which was the consequence of their apostasy, would be a suffieient punishment. This, however, was not the sentiment of Philip the Fair. That barbarous monarch, instigated by private revenge against some individuals of the order; encouraged by the prospect of sharing in their ample revenues; and spurred on by a spirit which seldom resides in a human breast, imprisoned in one day all the templars in France, merely at the instance of two worthless members of the order, who had been disgraced and punished by their superiors, for the enormity of their crimes. It was pretended by these base accusers, that the templars abjured our Saviour, that they spit upon his cross, that they burned their children, and committed other atrocious crimes, from which the human mind recoils with horror, and which could have been perpetrated only by men so completely abandoned as the informers themselves. Under the pretence of discovering what degree of credit might be attached to these accusations, the templars were extended on the rack till they confessed the crimes with which they were charged. Several of the knights, when stretched on this instrument of agony, made every acknowledgement which their persecutors desired. But others, retaining on the rack that fortitude and contempt of death which they had exhibited in the field, persisted in denying the crimes laid to their charge, and maintained with their latest breath, the innocence of their order. Many of those, even, who had tamely submitted to their perseeutors, retracted those ignominious confessions which the rack had extorted; and maintained their integrity in the midst of those flames which the barbarous Philip had kindled for their destruetion. Fifty-nine of these unhappy men were burnt alive at Paris, by a slow fire; and the same vindictive and inhuman spirit was exhibited in the other provinces of France, and in the other nations of Europe. The fortitude which, in every country, was displayed by these unfortunate sufferers, could have been inspired by innoeenee alone; and is a strong proof, that their minds were not so enervated by indolence, nor their bodies so eufeebled by luxury, as has been generally believed. The only murmurs which parted from their lips, were those which expressed their anguish and remorse, that they had betrayed, in the hour of pain, the interests of their order, and had confessed themselves guilty of crimes unworthy of a templar and a man.

Death of the grand master and other dignitaries.

41. But the atrocious scene was yet to come which was to eomplete the ruin of the templars, and satiate the vengeance of their enemies. Their grand master Molay, and other dignitaries of the order, still survived: and, though they had made the most submissive aeknowledgements to their unrelenting persecutors, yet the influence which they had over the minds of the vulgar, and their connection with many of the princes of Europe, rendered them formidable and dangerous to their oppressors. By the exertion of that influence, they might restore union to their dismembered party, and inspire them with courage to revenge the murder of their companions; or, by adopting a more cautious method, they might repel, by uncontrovertible proofs, the charges for which they suffered; and, by interesting all men in their behalf, they might expose Philip to the attacks of his own subjects, and to the hatred and contempt of Europe. Aware of the dangers to which his character and person would be exposed by pardoning the surviving templars, the French monarch commanded the grand master and his brethren to be led out to a scaffold, erected for the purpose, and there to confess before the public, the enormities of which their order had been guilty, and the justice of the punishment which had been inflicted on their brethren. If they adhered to their former confessions, a full pardon was promised to them; but if they should persist in maintaining their innocenee, they were threatened with destruction on a pile of wood, which the executioners had erected in their view, to awe them into compliance. While the multitude were standing around in awful expectation, ready, from the words of the prisoners, to justify or condemn their king, the venerable Molay, with a cheerful and undaunted countenance, advanced, in chains, to the edge of the scaffold; and, with a firm and impressive tone, thus addressed the spectators. "It is but just, that in this terrible day, and in the last moments of my life, I lay open the iniquity of falsehood, and make truth to triumph. I declare, then, in the face of heaven and earth, and I confess, though to my eternal shame and confusion, that I have committed the greatest of crimes; but it has been only in acknowledging those that have been charged with so much virulence upon an order, which truth obliges me to pronounce innocent. I made the first declaration they required of me, only to suspend the excessive tortures of the rack, and mollify those that made me endure them. I am sensible what torments they prepare for those that have courage to revoke such a confession. But the horrible sight which they present to my eyes is not capable of making me confirm one lie by another. On a condition so infamous as that, I freely renounce life which is already but too odious to me. For what would it avail me to prolong a few miserable days, when I must owe them only to the blackest of calumnies (G)." In consequence of this manly revocation, the grand master and his companions were hurried into the flames, where they retained that contempt of death which they had exhibited on former occasions. This mournful scene extorted tears from the lowest of the vulgar. Four valiant knights, whose charity and valour had procured them the gratitude and applause of mankind, suffering, without

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(G) Histoire de Chevaliers Hospitaliers de Saint Jean de Jerusalem, par Abbé Vertot, tom. ii. p. 101. 102.

Masonry. without fear, the most cruel and ignominious death, was indeed a spectacle well calculated to excite emotions of pity in the hardest hearts; and, whatever opinion we may entertain concerning the character of that unhappy order, every mind of sensibility will compassionate the fate of the templars, and curse the inhuman policy of Philip the Fair.

The innocence of the knights templars considered.

42. From this short and imperfect account of the origin and ruin of the knights templars, the reader will be enabled to understand the merits of the question, respecting the innocence of that order, which it will be necessary here to consider. The opinions of contemporary writers were too much influenced by party spirit, and religious zeal, to deserve any regard in this investigation. All those writers (H), however, who are generally deemed impartial historians, and who were in no respects interested, either in the condemnation or acquittal of the templars, have, without hesitation, pronounced them innocent of the crimes laid to their charge, and imputed their destruction to the avarice and private resentment of Philip. In the decision of these historians, the public had, in general, acquiesced, till their sentiments were unsettled by the bold pretensions, and the sophistical reasoning of Barruel. This writer has charged upon the templars all those crimes with which their enemies had formerly loaded them: he has attempted to justify the severity of the French king, and has reproached, with the bitterest invective, the society of free masons, because they were once connected with a fraternity, which, in his opinion, was so wicked and profane. While we endeavour, therefore, to defend the templars against these recent calumnies, we shall, at the same time, be maintaining the respectability of the masonic institution, by vindicating its members from that imputed depravity, which, according to Barruel, they have inherited from their fathers.

43. In order to form an impartial judgment respecting any sentence which has been passed, without proper evidence, either against individuals or associations, it is necessary to be acquainted with the motives and character of the accusers, and with the benefits which might accrue to them and the judges, by the punishment or liberation of the accused. In the case before us, the accusers had been disgraced and imprisoned by the accused, for their villany and crimes. Their chief prosecutor and judge was actuated by motives of avarice and private resentment; and many rival orders who had been languishing in obscurity and indigence, propagated with assiduity the slanderous tale, in hopes of sharing in those ample possessions, and that public favour, which had been acquired by the superior abilities of the knights templars. To all ranks of men, indeed, the veneration which the name of a templar inspired, was an object of envy: their opulent revenues were calculated to give trouble to a covetous mind, and the remarkable regularity of their conduct was no small incitement to the exercise of detraction. Such were the motives and prospects of their judges and accusers. Let us attend now to the accusations which were brought against them, and we shall find that these could scarcely come under the cognizance of law, as their pretended crimes were committed against themselves and not against society. Did they perpetrate murder upon any of their fellow-citizens?—This was never laid to their charge. Did they purloin any man's treasures?—Of theft they were never accused. Did they instigate to rebellion the subjects of any goverment, or plot destruction against the person of any king?—Under such a character they were never known, till Barruel called them traitors and regicides; because, forsooth, it was his opinion, that their successors, the free masons in France, were accessory to the murder of their king. What then were their crimes? it was said, that they burned their own infants! and yet an instance was never produced, in which the child of a templar had disappeared, and in which the tenderness of a mother, as would certainly have happened, remonstrated against the murder of her child. They were said to have committed the most unnatural of all crimes! and yet no individual produced a specific instance which he could corroborate by indubitable proof. They were accused of insulting the cross of Christ; and yet they had shed their blood in the defence of his religion. Of crimes like these, one may conceive a depraved individual to have been guilty; but to believe, that a respectable fraternity, consisting of thousands of members, could be capable of such enormities, requires a degree of faith to which the most credulous will scarcely attain.

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44. The innocence of the templars, and the injustice of Philip, will be still more apparent, by considering the conduct of the latter, as related even by Barruel. This writer observes, "That two men, who had been imprisoned for their crimes, declared that they had some important discoveries to make concerning the knights templars, and that this declaration, though entitled to little credit, made the king determine on the dissolution of the order, and arrest on one day all the templars in his kingdom (I)." Here then was the most flagrant injustice in the very threshold of the whole affair. Without summoning a single witness; without examining a single templar; without consulting a single friend; without even knowing what the important discoveries were which the criminals had to make; the French king *determined* on the destruction of the templars, on the destruction of an order whose grand master had been his particular friend, and even the godfather of one of his children (K). This latter circumstance, indeed, is brought forward by Barruel, to justify the conduct of Philip, because he sacrificed the duties of friendship to the principles of justice. But, when we take it in connection with the rest of his conduct, it must inspire every honest mind with a more degrading opinion of the head and heart of that persecuting monarch.

45. Such being the premature and precipitant determination of Philip, we may consider the order of the templars as at that time dissolved, and regard all those examinations,

(H) Among these we may reckon Hume, History of England, vol. ii. p. 373. Henry, History of Britain, vol. viii. p. 43. and Vertot, *ut supra*.

(I) Memoirs of Jacobinism, vol. ii. p. 364.

(K) Id. Id. p. 366.

Masonry. examinations, inquiries, confessions, trials, and councils which succeeded, as mere phantoms of justice, conjured up by that crafty prince, to dazzle the eyes of his subjects, and sanctify the depravity of his own conduct. By keeping this circumstance in view, the intelligent reader will be enabled to understand the minute, though sometimes contradictory, details of historians, respecting the trial and confessions of the knights templars; and, notwithstanding the veil of justice with which the judges attempted to cover their proceedings, he will be enabled to develope the detestable principles upon which their trial was conducted, and the still more detestable motives which invited Clement V. to partake in the guilt of Philip the Fair.

46. The most formidable, and indeed the only plausible argument by which Barruel supports his opinions, is drawn from the confessions of the templars. He maintains that the avowals of the knights were free from compulsion, and that no set of men could be so base as to accuse their brethren of crimes, of which they believed them to be entirely innocent. But the fallacy of his reasoning will appear from the slightest reflection. It is a curious, though unquestionable fact, that, when an avowal must be made, men are more ready to accuse themselves of crimes of which they have never been guilty, than to confess those which they have actually committed. Such as have attended to the operation of their own minds, particularly in the earlier part of life, will acquiesce in this extraordinary truth; and those who have not had occasion to observe it, will find, upon consideration, that it is consonant to the constitution of the human mind. When a man confesses himself guilty of a crime which he has really perpetrated, he is exposed, not only to the reproaches of his own conscience, but to those of the world; and, should he, at any time, retract his confessions, he must be aware that every subsequent inquiry would only confirm the truth of his first deposition. But when a man, from a principle of fear, acknowledges the truth of accusations with which he has been unjustly loaded, a sense of his integrity and innocence supports him under the opprobrium of the world, and he is conscious that his character will be vindicated by every investigation, and that the confessions which he himself made, may at any time be proved to have been the offspring of necessity. Such undoubtedly were the feelings by which the templars were actuated. Convinced, that the crimes which they were desired to acknowledge, were of such an unnatural kind, that they could never be imputed, by any reasonable man, to a numerous and hitherto respectable fraternity, they yielded to the solicitations of their persecutors; with the well-grounded hope that future inquiry would remove the stain which the irresistible desire of self-preservation had prompted them to throw upon their character. From this very consideration, indeed, namely from the nature of the crimes charged upon the templars, have many eminent historians maintained the innocence of that unhappy order. But were we even to allow with Barruel, in opposition to all history, that the avowals of the knights were free and numerous; by an application of the principles already laid down, we would from that circumstance, prove the innocence, and not the guilt of the templars. Masonry.

47. It is not, however, upon speculative principles alone, that we can account for the confessions and subsequent recantations of the knights. There are, fortunately, some historical facts which furnish a rational explanation of their conduct; but which Barruel, either from ignorance or design, has totally overlooked. About the commencement of the whole affair, Molay the grand master of the order, had been examined at Paris. From the causes already explained, but particularly from a dread of those torments, to which an obstinate avowal of his innocence would expose him, he made every confession which his persecutors demanded; but he at the same time transmitted circular letters to an immense number of his brethren, requesting them to make the same confessions with himself (L); for it was only by submissive conduct, that they could hope to disarm the fury of their enemies, and avert the blow which was threatened to their order. Agreeably to the request of Molay, many of the templars made the same acknowledgments; while others with a morality more inflexible, and courage more undaunted, disdained to do evil that good might come, and persevered unto death in the avowal of their own innocence, and that of their order. Molay, however, and those knights who had followed his example, soon perceived that though their submissions had protected them from injury as individuals, they had nevertheless rather inflamed the rage of Philip against the order; and being now convinced that their acknowledgements of guilt had produced an effect opposite to what they expected, they boldly retracted their former avowals, and adopted that intrepid conduct of which we have already given a short account. There is another circumstance connected with this part of our subject, which, though not taken notice of by historians, is well deserving of the reader's attention. It is asserted by all contemporary writers, whether the friends or adversaries of the templars, that all those knights who maintained their innocence, were condemned either to death, or to a punishment equally severe; while all who confessed, and adhered to their confessions, were either completely acquitted, or sentenced to a few days fasting and prayer, or a short imprisonment (M). It is allowed also by these historians, and even by Barruel, that a very considerable number of the templars were altogether ignorant of the crimes perpetrated by the rest, and that some who were privy to them, were not partakers in their guilt. In which class then are we to rank these innocent men? among those who suffered or among those who were saved? If among the former, their enemies were guilty of the most flagrant injustice and cruelty, in consuming the innocent on the same pile with the guilty. If among the latter, they must have been compelled to confess themselves guilty of crimes of which they were completely innocent.

48. In order to show that the confessions of the templars

(L) Histoire de Chevaliers Hospitaliers, par Abbé Vertot, tom. ii. p. 86.
(M) Some of them even received pensions for their confessions. See Vertot, tom. ii. p. 91.

Masonry. plars were voluntary, and not extorted by the rack. Barruel is obliged to deny facts which are admitted by every historian. But, lest his readers should not be so sceptical on this point as himself, he takes care to inform them, that the bishops declared, that all whose confessions were extorted by the rack, should be regarded as innocent, and that no templar should be subject to it; that Clement V. rather favoured the templars, and that he sent the most venerable persons to interrogate those whose *age and infirmities* prevented them from appearing before him. But who were those aged and infirm templars to whom Clement is so compassionate? Were they men smarting under diseases inflicted by the hand of heaven? Were they men whose aged limbs were unfit for the fatigues of a journey, or whose gray hairs had excited the pity of the Roman pontiff? No—they were a few undaunted knights whom the blood-extorting screws of their tormentors had tortured and disabled; whose flesh had been lacerated on the rack, and whose bones had been disjointed or broken on the wheel. These are the men, who, in the language of the above writer, were prevented by *their age and infirmities* from travelling to Poictiers, or who, in the more simple style of the Pope himself, were unable *to ride on horseback, or to bear any other method of conveyance whatsoever.*

49. Having thus endeavoured to vindicate the character of the templars from the accusations of their enemies, it will be necessary to make a few remarks respecting the ceremonial observances which are attributed to them and their posterity, by the author of the memoirs of Jacobinism. But this, our enemies well know, is forbidden ground, on which free masons are prohibited to enter by the laws of their order. It is here, consequently, that the most numerous, and apparently the most successful attacks have been made, for we can be provided with no means of defence without laying open the mysteries of the fraternity. Conscious of the disadvantages under which free masons labour, their adversaries have fabricated the most frightful and foolish ceremonies, and imposed them upon the world as the ceremonies of masonry. Among this number, may be reckoned those rites and oaths which Barruel ascribes to the templars and their posterity, but which, we solemnly aver, have no connexion either with the one or the other; and, were we permitted to divulge to the world the whole of our ritual system, many who have duped the public by deceitful information, would stand abashed at their conduct; while others, who have confided in such information, would be astonished at the extent of their credulity. Then might free masons defy, as they have done in every other point, the fabrications of the malicious, and the conjectures of the ignorant: then, too, might they mock at the ingenuity of the wise. But, as they are bound to preserve from public view the rites of their order, it is highly disingenuous to assail them in a quarter where resistance is impossible, and where every unprincipled man may triumph with impunity. Is not this to assassinate an enemy with his hands tied behind his back? Is not this to reproach a foe who is deprived of the organs of utterance?

50. But there is another important consideration, which, while it points out in a more striking manner the disingenuity of such conduct, should, at the same time, incite the candid inquirer to reject every calumny against secret associations, arising from reports concerning their rites and ceremonies. If ever the secrets of free masonry were betrayed, they must have been betrayed by men who were completely destitute of religious principle; who paid no respect to those ties which unite the members of civil, as well as secret associations; who, in short, neither feared God, nor regarded man. Suppose, then, that a person, pretending to be a free mason, offered to communicate, either to an individual, or to the public, the rites and ceremonies of his order. What degree of credit should men of probity attach to the information thus received? A person addresses them under the character of a perjurer, offering to violate the most solemn engagements, and to divulge mysteries which have been concealed for ages. He may give them accurate information, or he may not. If the secrets which he offers to betray have been hitherto unknown, there is no possible way of ascertaining the truth of his deposition. And it is rather to be suspected, than he will dupe his auditors by false information, than trample upon an engagement, guarded by the most awful sanctions. He might, indeed, confirm by an oath, the truth of his asseveration; but, as he must have violated an oath equally solemn, no man of sense will give him the smallest credit. But, supposing that he really divulges the secrets and ceremonies of free masonry, it is clear, that he has not understood their true import, or, at least, that they have made no impression upon his mind. It is almost certain, therefore, that, from ignorance, or misapprehension of their meaning, he will exhibit, under an aspect calculated to excite ridicule, those rites and ceremonies, which, if properly explained, would command admiration. If then it be so difficult for the uninitiated to discover the secrets of free masonry, and still more so to ascertain their signification, if they should discover them; what must we think of those men who open their ears to every slanderous tale against free masons, which unprincipled men may impose upon their credulity? What must we think of those who reproach and vilify the order, upon the uncertain reports of cunning and interested men? We appeal to the impartial reader, if they are not equally base with the informers themselves. Masonry.

51. Such are the considerations by which we would attempt to repel those charges and distorted facts, with which Barruel has calumniated the character, and disfigured the history of the templars. They will be sufficient, we hope, to remove those erroneous impressions which the perusal of the Memoirs of Jacobinism may have left upon the reader's mind. Although we have adopted the opinion of those who maintain the innocence of that unfortunate order, we cannot coincide with them in believing, that, as individuals, they were free from blame. The templars were possessed of the same nature, and influenced by the same passions as their fellow men; and they were, unquestionably, exposed to more strong and numerous temptations. Some of the knights therefore, may have been guilty of crimes, and these too of an aggravated kind, which, by a strange, though not uncommon mistake, might have been transferred to their order. But it was never proved that they were traitors, child-murderers, regicides, and infidels. A certain class of historians, indeed,

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deed, have imputed to them such iniquities; and, when unable to establish their assertions, have fixed upon their order the more probable crimes of drunkenness and debauchery. But amidst all these accusations, we hear nothing of that valour which first raised the templars to pre-eminence; nothing of that charity and beneficence which procured them the respect of contemporaries; nothing of that fortitude and patience which most of them exhibited on the rack, and in the flames. In their case it has been too true, that

> The evil which men do lives after them:
> The good is often interred with their bones.

52. But allowing the templars to be as guilty as their enemies have represented them; upon what principles of sound reasoning, or of common sense, does Barruel transfer their guilt to the fraternity of free masons? Is it absolutely necessary, that the son should inherit the bodily diseases, and the mental debility of his fore-fathers? or is it fair, that one order, proposing to itself the same object, and instituted upon the same principles as another, should be charged also with the same crimes? certainly not. If virtue and vice were hereditary qualities, free masons might arrogate to themselves much honour from their connection with the templars; but, as we have not been applauded for a templar's virtues, we should not be reproached for a templar's crimes. But the reasoning of Barruel is as repugnant to the dictates of experience, as it is to those of common sense. Were not the inhabitants of England, at one period, fanatics, rebels, and regicides? But where now is the nation that is more liberal in its religion, and more steady in its loyalty! Did not the French, at one time, torture, burn, and massacre their fellow citizens, from the fury of their religious zeal, and the strength of their attachment to the Catholic communion? But what nation under heaven was a few years ago less influenced by religious principles, and less attached to the church of Rome! Did not the rulers of France, at one time, torment and assassinate hundreds of the templars, because they deemed them infidels, traitors, and regicides? And have we not seen, in these latter days, the very rulers of France themselves, infidels, traitors, and regicides! But if the impartial reader should, upon farther inquiry, give credit to the guilt of the templars; in order to remove the imputed stain which has been transferred to free masons, it may be sufficient to address him in the words of the poet,

Tempora mutantur, et nos mutamur in illis.

Origin and advantages of chivalry.

53. About the time of the knights templars, chivalry had arrived at its highest perfection. It had its existence, indeed prior to this period, but as it continued to influence the minds of men long after the destruction of that unhappy order, it was thought proper to defer its consideration till the present stage of our history. When chivalry made its first appearance, the moral and political condition of Europe was in every respect deplorable. The religion of Jesus existed only in name. A degrading superstition had usurped its place, and threatened ruin to the reason and the dignity of man. The political rights of the lower orders were sacrificed to the interest of the great. War was carried on with a degree of savage cruelty, equalled only by the sanguinary contentions of the beasts of prey; no clemency was shown to the vanquished, and no humanity to the captive. The female sex, even, were sunk below their natural level: they were doomed to the most laborious occupations, and were deserted and despised by that very sex, on whose protection and sympathy they have so natural a claim. To remedy these disorders, a few intelligent and pious men formed an association, whose members swore to defend the Christian religion, to practise its morals, to protect widows, orphans, and the weaker sex; and to decide judicially, and not by arms, the disputes that might arise about their goods or effects. It was from this association, undoubtedly, that chivalry arose (N); and not, as some think, from the public investiture with arms which was customary among the ancient Germans. But, whatever was its origin, chivalry produced a considerable change in the manners and sentiments of the great. It could not, indeed, eradicate that ignorance and depravity which engendered those awful evils which we have already enumerated. It has softened, however, the ferocity of war. It has restored the fair sex to that honourable rank which they now possess, and which at all times they are entitled to hold. It has inspired those sentiments of generosity, sympathy, and friendship, which have contributed so much to the civilization of the world; and has introduced that principle of honour, which, though far from being a laudable motive to action, often checks the licentious, when moral and religious considerations would make no impression upon their minds.

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54. Such was the origin of chivalry, and such the blessings which it imparted. That it was a branch of free masonry, may be inferred from a variety of considerations, from the consent of those who have made the deepest researches into one, and who were intimately acquainted with the spirit, rites, and ceremonies of the other. They were both ceremonial institutions. Important precepts were communicated to the members of each, for the regulation of their conduct as men, and as brethren of the order (O). The ceremonies of chivalry, like those of free masonry, though unintelligible to the vulgar, were always symbolical of some important truths (P). The object of both institutions was the same, and the members bound themselves, by an oath, to promote it with ardour and zeal (Q). In chivalry there were also different degrees of honour, through which the youths were obliged to pass before they were invested with the dignity of knighthood (R); and the knights, like free masons, were formed into fraternities or orders, distinguished by different appellations (S).

Chivalry a branch of free masonry.

55. From

(N) Boutainvilliers on the Ancient Parliaments of France, letter fifth, quoted in Brydson's Summary View of Heraldry, pp. 24, 25, 26.
(O) Brydson's Summary View of Heraldry, p. 31.
(P) Id. p. 95.
(Q) Id. p. 32.
(R) Id. pp. 36, 37.
(S) Id. pp. 38. 40.

Masonry. Proved from the opinions of the learned and other considerations.

55. From these circumstances of resemblance, we do not mean to infer that chivalry was free masonry under another name; we mean only to show that the two institutions were intimately connected; that the former took its origin from the latter, and borrowed from it, not only some of its ceremonial observances, but the leading features and the general outline of its constitution. These points of similarity, indeed, are in some cases so striking, that several learned men have affirmed that free masonry was a secondary order of chivalry, and derived its origin from the usages of that institution (T). From what reasons these authors deduce the forms of free masonry from the ceremonies of chivalry, it is difficult to conjecture. The only argument which they adduce, is the similarity of the institutions; but they do not consider, that this proves, with equal force, that free masonry is the parent of chivalry. We have already shown, that there were many secret institutions among the ancients, but particularly the fraternity of Dionysian architects, which resembled free masonry in every thing but the name; and it requires no proof that these fraternities arose many hundred years before the existence of chivalry. If then there be any resemblance between the institutions which we have been comparing, we must consider free masonry as the fountain, and chivalry only as the stream. The one was adapted to the habits of intelligent artists, and could flourish only in times of civilization and peace; the other was accommodated to the dispositions of a martial age, and could exist only in seasons of ignorance and war. With these observations, indeed, the history of both fraternities entirely corresponds. In the enlightened ages of Greece and Rome, when chivalry was unknown, free masonry flourished under the sanction of government, and the patronage of intelligent men. But during the reign of Gothic ignorance and barbarity, which followed the destruction of imperial Rome, free masonry languished in obscurity, while chivalry succeeded in its place, and proposed to accomplish the same object by different means, which, though more rough and violent, were better suited to the manners of the age. And when science and literature revived in Europe, and scattered those clouds of ignorance and barbarism with which she had been overshadowed, chivalry decayed along with the manners that gave it birth, while free masonry arose with increasing splendour, and advanced with the same pace as civilization and refinement.

The connexion of chivalry and free masonry exemplified in the society of the templars.

56. The connexion between chivalry and free masonry, is excellently exemplified in the fraternity of the knights templars. It is well known that this association was an order of chivalry, that the templars performed its ceremonies, and were influenced by its precepts; and we have already shown, that the same association was initiated into the mysteries, and practised the rites of free masonry (Art. 39, 40.): But, though they then existed in a double capacity, it must be evident to all who study the history of the templars, that their masonic character chiefly predominated, and that they deduced the name of their institution, and their external observances, from the usages of chivalry, to conceal from the Roman pontiff the primary object of their order, and to hold their secret meetings free from suspicion or alarm. About this time, indeed, the church of Rome sanctioned the fraternity of operative masons, and allowed them to perform their ceremonies without molestation or fear. But this clemency, as we have already shown, was the offspring of necessity (Art. 37.); and the same interested motive which prompted his holiness to patronize that trading association, could never influence him to countenance the duplicity of the templars, or permit them to exist in their masonic capacity. It was the discovery, indeed, of their being free masons, of their assembling secretly, and performing ceremonies to which no stranger was admitted, that occasioned those awful calamities which befel their order. It will, no doubt, appear surprising to some readers, that such zealous defenders of the Catholic religion should practise the observances of an association, which the church of Rome has always persecuted with the bitterest hostility. But their surprise will cease, when it is recollected, that even about the middle of the 18th century, when free masonry was prohibited in the ecclesiastical states, by a papal bull, the members of the Romish church adopted the same plan. So much attached were they to the principles and practice of the fraternity, that they established a new secret association similar to that of free masonry, into which they professed to admit none but zealous abettors of the papal hierarchy. In this manner, by flattering the pride of the church, they eluded its vigilance, and preserved the spirit of free masonry, by merely changing its name, and professing to make it subservient to the interest of the pontificate.

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The templars were initiated by Syriac fraternities.

57. Before leaving this subject, it may be interesting to some readers, and necessary for the satisfaction of others, to show in what manner the knights templars became depositaries of the masonic mysteries. We have already seen, that almost all the secret associations of the ancients either flourished or originated in Syria, and the adjacent countries. It was here that the Dionysian artists, the Essenes, and the Kasideans arose. From this country also came several members of that trading association of masons, which appeared in Europe during the dark ages (U); and we are assured, that, notwithstanding the unfavourable condition of that province, there exists, at this day, on Mount Libanus, one of these Syriac fraternities (X). As the order of the templars, therefore, was originally formed in Syria, and existed there for a considerable time, it would be

(T) Chevalier Ramsay. See Robison's Proofs of a Conspiracy, p. 39. Leyden's Preliminary Dissertation to the Complaynt of Scotland, pp. 67. 71. and the preface to Guilliam's Display of Heraldry, edit. 6th.

(U) Mr Clinch, who appears not to have been acquainted with this fact, supposes that free masonry was introduced into Europe by means of the Gypsies. Anthologia Hibernica, for April 1794, p. 280. There was such a constant communication between Asia and Europe in the time of the crusades, that the customs and manners of the one, must, in some measure, have been transferred to the other.

(X) Anthologia Hibernica, April 1794, p. 279.

Masonry. no improbable supposition that they received their masonic knowledge from the lodges in that quarter. But we are fortunately in this case not left to conjecture, for we are expressly informed by a foreign author (Y), who was well acquainted with the history and customs of Syria, that the knights templars were actually members of the Syriac fraternities.

History of free masonry in Britain.

58. Having thus compared free masonry with those secret associations which arose during the dark ages; let us now direct our attention to its progress in Britain, after it was extinguished in the other kingdoms of Europe. We have already seen that a trading fraternity of free masons existed in Europe during the middle ages; that many special favours were conferred upon it by the Roman see; that they had the exclusive privilege of erecting those magnificent buildings, which the pride of the church of Rome, and the misguided zeal of its members, had prompted them to rear; and that several masons travelled into Scotland, about the beginning of the 12th century, and imported into that country the principles and ceremonies of their order. And we have illustrated several causes which preserved this association in Britain after its total dissolution on the continent.

Free masonry introduced into Scotland.

59. That free masonry was introduced into Scotland by those architects who built the abbey of Kilwinning, is manifest, not only from those authentic documents, by which the existence of the Kilwinning lodge has been traced back as far as the end of the 15th century, but by other collateral arguments, which amount almost to a demonstration. In every country where the temporal and spiritual jurisdiction of the pope was acknowledged, there was a continual demand, particularly during the 12th century, for religious structures, and consequently for operative masons, proportional to the piety of the inhabitants, and the opulence of their ecclesiastical establishment; and there was no kingdom in Europe where the zeal of the inhabitants for popery was more ardent than in Scotland, where the kings and nobles were more liberal to the clergy, and where, of consequence, the church was more richly endowed (Z). The demand, therefore, for elegant cathedrals and ingenious artists, must have been proportionably greater than in other countries, and that demand could be supplied only from the trading association on the continent. When we consider, in addition to these facts, that this association monopolized the building of religious structures in Christendom; we are authorised to conclude, that those numerous and elegant ruins, which still adorn the villages of Scotland, were erected by foreign masons, who introduced into this island the customs of their order.

And also into England.

60. It was probably about this time, also, that free masonry was introduced into England; but whether the English received it from the Scotch masons at Kilwinning, or from other brethren who had arrived from the continent, there is no method of determining. Masonry. The fraternity in England, however, maintain, that St Alban, the proto-martyr, who flourished about the end of the third century, was the first who brought masonry to Britain; that the brethren received a charter from King Athelstane, and that his brother Edwin summoned all the lodges to meet at York, which formed the first grand lodge of England (A). But these are merely assertions, not only incapable of proof from authentic history, but inconsistent also with several historical events which rest upon indubitable evidence (B). In support of these opinions, indeed, it is alleged, that no other lodge has laid claim to greater antiquity than that of York, and that its jurisdiction over the other lodges in England has been invariably acknowledged by the whole fraternity. But this argument only proves that York was the birthplace of free masonry in England. It brings no additional evidence in support of the improbable stories about St Alban, Athelstane, and Edwin. If the antiquity of free masonry in Britain can be defended only by the forgery of silly and uninteresting stories, it does not deserve to be defended at all. Those who invent and propagate such tales, do not, surely, consider that they bring discredit upon their order by the warmth of their zeal; and that, by supporting what is false, they prevent thinking men from believing what is true.

Progress of free masonry in Britain.

61. After the establishment of the Kilwinning and York lodges, the principles of free masonry were rapidly diffused throughout both kingdoms, and several lodges were erected in different parts of the island. As all these derived their existence and authority from the two mother lodges, they were likewise under their jurisdiction and controul; and when any differences arose, that were connected with the art of building, they were referred to the general meetings of the fraternity, which were always held at Kilwinning and York. In this manner did free masonry flourish for a while in Britain, after it was completely abolished in every part of the world. But even here it was doomed to suffer a long and serious decline, and to experience those alternate successions of advancement and decay, which mark the history of every human institution. And though during several centuries after the importation of free masonry into Britain, the brethren of the order held their public assemblies, and were sometimes prohibited from meeting by the interference of the legislature, it can scarcely be said to have attracted general attention till the beginning of the 17th century. The causes of this remarkable retardation which the progress of masonry experienced, it is by no means difficult to discover. In consequence of the important privileges which the order received from the church of Rome, many chose the profession of an architect, which, though at all times an honourable employment, was particularly in high request during the middle ages. On this account, the

(Y) Adler de Drusis Montis Libani, Rom. 1786.

(Z) The church possessed above one-half of the property in the kingdom. Robertson's History of Scotland, vol. i. pp. 137, 65, 269.

(A) A. D. 926. Preston's Illustrations of Masonry, p. 148. Smith's Use and Abuse of Free Masonry, p. 51. Free Mason's Calendar 1778.

(B) See Dr Plot's Natural History of Staffordshire, chap. viii. pp. 316—318.

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the body of operative masons increased to such a degree, and the rage, as well as the necessity for religious edifices, was so much diminished, that a more than sufficient number of hands could, at any time, be procured for supplying the demands of the church, and of pious individuals. There being now no scarcity of architects, the very reason which prompted the church to protect the fraternity, ceased to exist; they, therefore, withdrew from them that patronage, which they had spontaneously proffered, and denied them even the liberty of holding their secret assemblies. But these were not the only causes which produced such a striking change in the conduct of the church, to the masonic order. The spirit of free masonry, as we have already said, was hostile to the principles of the church of Rome. The intention of the one was to enlighten the mind; the object and policy of the other to retain it in ignorance. When free masonry flourished, the power of the church must have decayed. The jealousy of the latter, therefore, was aroused; and, as the civil power in England and Scotland was almost always in the hands of ecclesiastics, the church and the state were combined against the principles and practice of free masonry (C). Along with these causes, the domestic and bloody wars, which convulsed the two kingdoms from the 13th to the 17th century, conspired in a great degree, to produce that decline of the fraternity for which we have been attempting to account.

Causes of its subsequent decline.

62. But notwithstanding these unfavourable circumstances, free masonry seems to have flourished, and attracted the attention of the public in the reign of Henry VI. who, when a minor, ascended the throne of England in 1422. In the third year of his reign, indeed, the parliament passed a severe act against the fraternity, at the instigation of Henry Beaufort, bishop of Winchester, who was then entrusted with the education of the young king. They enacted that the masons should no longer hold their chapters and annual assemblies; that those who summoned such chapters and assemblies should be considered as felons; and that those who resorted to them should be fined and imprisoned (D). But it would appear that this act was never put in execution; for, in the year 1429, about five years after it was framed, a respectable lodge was held at Canterbury under the patronage of the archbishop himself (E). When King Henry was able to take into his own hands the government of his kingdom, and to form an opinion of his own respecting the use and tendency of the masonic fraternity, in order to atone for the rigorous conduct of his parliament, he not only permitted the order to hold their meetings without molestation, but honoured the lodges by his presence as a brother. Before he was initiated, however, into the mysteries of the order, he seems to have examined, with scrupulous care, the nature of the institution, and to have perused the charges and regulations of the fraternity, as collected from their ancient records. These facts are contained in a paper written in the reign of his successor, Edward IV. and confirmed by a manuscript in King Henry's own hand-writing, which is familiar to every person who has studied the history of the order. This manuscript consists of questions and answers respecting the nature and tendency of free masonry, and seems to be the result of the king's examination of some of the brethren before he became a member of the fraternity. It was first procured from the Bodleian library by the celebrated Mr Locke, who transmitted it to the earl of Pembroke, accompanied with explanatory notes (F). In the title of the manuscript, it is said to have been faithfully copied from the hand-writing of King Henry VI. by John Leland, antiquarian, who, according to Mr Locke, was the celebrated antiquary of that name who lived in the 16th century, and was appointed by King Henry VIII. at the dissolution of monasteries, to search for, and save such books as were worthy of preservation. As this manuscript was originally printed at Frankfort, I was led to inquire what grounds there were for believing that the explanatory notes, and the letter to the earl of Pembroke which accompany it, were the production of Mr Locke. But I found that this had been uniformly taken for granted by every writer upon the subject, though the circumstance is not mentioned in the large edition of Mr Locke's works. The style of the letter, however, and the acuteness of the annotations, resemble so much that philosopher's manner of writing, and the letter is so descriptive of Mr Locke's real situation at the time when it was written, that it is almost impossible to deny their authenticity. In the letter itself, which is dated 6th May 1696, Mr Locke remarks that he composed the notes for the sake of Lady Masham, who was become very fond of masonry, and that the manuscript had so much excited his own curiosity, that he was determined to enter into the fraternity the next time he went to London, which, he adds, will be very soon. Now Mr Locke was at this time residing at Oates, the country seat of Sir Francis Masham, as appears from one of his letters to Mr Molyneux,

Free masonry flourishes in the reign of Henry VI.

Masonry.

Account of a curious masonic manuscript.

(C) As a proof of the hostility of the church of Rome to secret associations which pretended to enlighten the mind, we mentioned (p. 53. supra) its treatment of the academy of secrets, instituted in the 16th century for the advancement of physical science. When a local and temporary institution drew down the vengeance of the Roman see, what must have been its conduct to a lodge of masons? A farther account of the academy of secrets may be found in Priestley's History of Vision, vol. ii.

(D) 3 Henry VI. cap. 2. A. D. 1425, see Ruffhead's Statutes. Dr Plot's Natural History of Staffordshire, chap. viii. p. 318.

(E) Manuscript Register of William Morlat, prior of Canterbury, p. 28. entitled, *Liberatio generalis Domini Gulielmi prioris Ecclesiæ Christi Cantuarensis, erga festum natalis Domini* 1429. In this Register are mentioned the names of the masters, wardens, and other members of the lodge.

(F) This manuscript was first printed at Frankfort in 1748, and afterwards reprinted in the London and Gentleman's Magazines for 1735. It may be seen in the lives of Leland, Hearne, and Wood, 8vo. Oxford, 1772, vol. i. pp. 96, 104. Appendix, N° viii.; and in Preston's Illustrations of Masonry, p. 110.

Masonry. which is dated Oates, March 30. 1696; and it appears, that he actually went to London, a short time after the 6th of May; for another letter to the same gentleman is dated, London, 2d July 1696 (G). Notwithstanding these facts, Dr Plot maintains that free masonry was not patronised by King Henry VI. (H), and that those who have supported a different opinion, were ignorant of the laws and chronicles of their own country. Dr Plot may have been a good chemist and natural historian, but when our readers hear upon what foundation he has established his opinion, they will agree with us in thinking that he was a bad logician. He observes, that an act was passed in the king's minority, prohibiting all general assemblies and chapters of free masons, and that as this act was not repealed till 1562, by 5th Elizabeth, cap. 4. it was impossible that free masonry could be patronised in the same reign in which it was prohibited. The fact is, that the act was not repealed by 5th Elizabeth, cap. 4. which does not contain a single word about freemasons. If Dr Plot's argument, therefore, proves any thing, it would prove that free masonry has not been patronised since the reign of Henry VI. for that act has never yet been repealed. But supposing that it was repealed, the prohibitory statute in Henry's reign might never have been put in execution, as very often happens; and Dr Plot himself remarks, that the act 5th Elizabeth was not observed. It is plain, therefore, that instead of being impossible, it is highly probable that King Henry patronised the fraternity. When they were persecuted by his parliament, he was only three years of age, and could neither approve nor disapprove of its sentence; and it was very natural, that when he came to the years of maturity, he should undo a deed which his parliament had dishonourably done.

Free masonry patronised in Scotland by King James I.

63. While free masonry was flourishing in England under the auspices of Henry VI. it was at the same time patronised, in the sister kingdom, by King James I. By the authority of this monarch, every grandmaster who was chosen by the brethren, either from the nobility or clergy, and approved of by the crown, was entitled to an annual revenue of four pounds Scots from each master mason, and likewise to a fee at the initiation of every new member. He was empowered to adjust any differences that might arise among the brethren, and to regulate those affairs, connected with the fraternity, which it was improper to bring under the cognizance of the courts of law. The grandmaster also appointed deputies or wardens, who resided in the chief towns of Scotland, and managed the concerns of the order, when it was inconvenient to appeal to the grandmaster himself (I).

And by King James II.

64. In the reign of James II. free masonry was by no means neglected. The office of grandmaster was granted by the crown to William St Clair, earl of Orkney and Caithness, baron of Roslin, and founder of the much admired chapel of Roslin. On account of the attention which this nobleman paid to the interests of the order, and the rapid propagation of the royal art under his administration, King James II. made the office of grandmaster hereditary to his heirs and successors in the barony of Roslin; in which family it continued till the institution of the grand lodge of Scotland. The barons of Roslin, in the capacity of hereditary grandmasters, held their principal annual meetings at Kilwinning, the birthplace of Scotish masonry, while the lodge of that village granted constitutions and charters of erection to those brethren of the order, who were anxious that regular lodges should be formed in different parts of the kingdom. These lodges all held of the lodge of Kilwinning; and, in token of their respect and submission, joined to their own name, that of their mother lodge, from whom they derived their existence as a corporation (K). Masonry.

65. During the reigns of the succeeding Scotish monarchs, free masonry still flourished, though very little information can be procured respecting the state of the fraternity. In the privy seal book of Scotland, however, there is a letter dated at Holyroodhouse, 25th September 1590, and granted by King James VI. "to Patrick Copland of Udaught, for using and exercising the office of wardanrie over the art and craft of masonric, over all the boundis of Aberdeen, Banff, and Kincardine, to had wardan and justice courts within the said boundis, and there to minister justice (L)." This letter confirms what has already been said concerning the state of masonry in Scotland. It proves beyond dispute, that the kings of Scotland nominated the office-bearers of the order; that these provincial masters, or wardens, as they were then called, administered justice in every dispute which concerned the "art and craft of masonrie;" that lodges were established in all parts of Scotland, even in those remote, and, at that time, uncivilized counties of Aberdeen, Banff, and Kincardine; and it completely overturns the unfounded assertion of Dr Robison, who maintains (M), that the celebrated antiquary Elias Ashmole, who was initiated in 1646, is the only distinct and unequivocal instance of a person being admitted into the fraternity who was not an architect by profession.

Minutes of St Mary's chapel.

66. The minutes of St Mary's chapel, which is the oldest lodge in Edinburgh, extend as far back as the year 1598; but as they contain only the ordinary proceedings of the lodge, we can derive from them no particular information respecting the customs and condition of the fraternity. It appears, however, from these minutes, that Thomas Boswell, Esq. of Auchinleck, was made a warden of the lodge in the year 1600; and that the honourable Robert Moray, quartermaster-general to the army in Scotland, was created a master mason in 1641. These facts are deserving of notice, as they show, in opposition to Dr Robison, that persons were early admitted into the order, who were not architects by profession.

67. When

(G) Locke's Works, folio, vol. iii.
(H) Natural History of Staffordshire, cap. viii. p. 318.
(I) Charter. Hay's MSS. see art. 66
(K) Such as Canongate Kilwinning, &c.
(L) Privy Seal Book of Scotland, 61. F. 47.
(M) Proofs of a Conspiracy, p. 21.

Masonry.

The Sinclairs of Roslin appointed hereditary grand masters.

67. When James VI. ascended the throne of England, he seems to have neglected his right of nominating the office-bearers of the craft. In Hay's manuscript in the advocate's library, there are two charters granted by the Scotish masons, appointing the Sinclairs of Roslin their hereditary grandmasters. The first of these is without a date, but signed by several masons who appoint William St Clair of Roslin, his heirs and successors, their "patrons and judges." The other is, in some measure, a ratification of the first, and dated 1630, in which they appoint Sir William St Clair of Roslin, his heirs and successors, to be their "patrons, protectors, and overseers, in all time coming." In the first of these deeds, which seems to have been written a little after the union of the crowns, it is stated, that for some years the want of a protector had engendered many corruptions among the masons, and had considerably retarded the progress of the craft; and that the appointment of William Sinclair, Esq. was, with the advice and consent of William Shaw, master of work to his majesty. After presiding over the order for many years, William St Clair went to Ireland, where he continued a considerable time; and, in consequence of his departure, the second charter was granted to his son Sir William St Clair, investing him with the same powers which his father enjoyed. It deserves also to be remarked, that in both these deeds, the appointment of William Sinclair, earl of Orkney and Caithness, to the office of grandmaster, by James II. of Scotland, is spoken of as a fact well known, and universally admitted. These observations will set in a clear point of view what must hitherto have appeared a great inconsistency in the history of Scottish masonry. In the deed by which William Sinclair, Esq. of Roslin, resigned the office of hereditary grandmaster in 1736, it is stated that his ancestors, William and Sir William St Clair of Roslin, were constituted patrons of the fraternity by the Scotish masons themselves; while it is well known, that the grant of hereditary grandmaster was originally made by James II. of Scotland, to their ancestor, William Sinclair, earl of Orkney and Caithness. But, when we consider that James VI. by not exercising his power, virtually transferred to the craft the right of electing their office-bearers, the inconsistency vanishes; for Mr Sinclair and his predecessors, as far back as the date of these charters, held their office by the appointment of the fraternity itself. Lest any of Mr Sinclair's posterity, however, might, after his resignation, lay claim to the office of grandmaster, upon the pretence that this office was bequeathed to them by the grant of James II. to the earl of Caithness and his heirs; he renounces not only the right to the office which he derived from the brethren, but any right also, which as a descendant of the earl of Caithness, he might claim from the grants of the Scotish monarchs.

68. Notwithstanding those civil commotions which disturbed Britain in the 17th century, free masonry flourished in Scotland, under the auspices of the Sinclairs of Roslin. No particular event, however, which is worthy of notice, occurred during that time, or even during the remainder of the century. The annual assemblies of the fraternity were still held at Kilwinning, and many charters and constitutions were granted by the lodge of that village, for the erection of lodges in different parts of the kingdom.

Masonry.

The office of grandmaster resigned by W. Sinclair

69. In the year 1736, William St Clair of Roslin, who was then grandmaster of Scotland, was under the necessity of disponing his estate, and, as he had no children of his own, he was anxious that the office of grandmaster should not be vacant at his death. Having, therefore, assembled the Edinburgh and neighbouring lodges, he represented to them the utility that would accrue to the order, by having a gentleman or nobleman, of their own choice, as grandmaster of masonry in Scotland; and, at the same time, intimated his intention to resign into the hands of the brethren, every title to that office which he at present possessed, or which his successors might claim from the grants of the Scotish kings, and the kindness of the fraternity. In consequence of this representation, circular letters were dispatched to all the lodges of Scotland, inviting them to appear, either by themselves or proxies, on next St Andrew's day, to concur and assist in the election of a grandmaster. When that day arrived, about 32 lodges assembled, and, after receiving the deed of resignation from William Sinclair, proceeded to the election of another grandmaster; when, on account of the zeal which William Sinclair of Roslin had always shown for the honour and prosperity of the order, he was unanimously elected to that high office, and proclaimed grandmaster mason of all Scotland. Thus was instituted the grand lodge of Scotland, which continues to flourish at the present day.

Institution of the grand lodge of Scotland in 1736.

70. We have already brought down the history of masonry in England to the end nearly of the 15th century. During the whole of the 16th, and the beginning of the 17th century, no events occurred which can be inserted in a general history of the order. The lodges continued to meet, but seem neither to have attracted the notice, nor excited the displeasure of the legislature.

Free masonry flourished during the civil wars.

71. During the civil wars, however, between the king and the parliament, the fraternity appears to have been better known; and many were initiated into its mysteries, who were equally distinguished by their literary talents, and their rank in life. Elias Ashmole informs us, that he and Colonel Mainwaring were admitted into the order at Warrington, in October 1646 (N). This gentleman was the celebrated antiquarian who founded the Ashmolean museum at Oxford. His attachment to the fraternity is evident from his diligent inquiries into its origin and history, and his long and frequent attendance upon its meetings (O). Charles II. too, was a member of the fraternity, and frequently honoured the lodges with his presence (P). From this fact, chiefly, Dr Robison asserts, that free masonry was employed by the royalists for promoting the cause of their sovereign, and that the ritual of the masters degree seems to have been formed, or twisted from its original institution, in order to sound the political princi-

ples

(N) Ashmole's Diary, p. 15.
(P) Proofs of a Conspiracy, p. 22.

(G) Id. p. 66.

Masonry. ples of the candidate (Q). The strained and fanciful analogy by which this opinion is supported, is perhaps one of the most striking instances that could be adduced to show, to what peurile arguments the most learned will resort, when engaged in the defence of a desperate cause. But though Dr Robison maintains, that all who witnessed the ceremonies of the master's degree during the civil wars, could not fail to show, by their countenances, to what party they belonged, yet he observes, in another part of his work, that the symbols of masonry seemed to be equally susceptible of every interpretation, and that none of these were entitled to any decided preference (R). Such inconsistencies as these it is not easy to explain.

Free masonry is supposed by some to have originated in the time of the commonwealth.

72. An opinion of an opposite nature, though equally extravagant, has been maintained by Pivati (S), and the author of "Free Masonry Examined." These writers assert, that free masonry originated in the time of the English commonwealth; that Oliver Cromwell was its inventor; that the level was the symbol of republican equality; and that the other signs and ceremonies were merely arbitrary, and formed for concealing their political designs.

Absurdity of this opinion.

It would be ridiculous to enter into a serious refutation of such opinions as these, which are founded on the most unpardonable ignorance. That free masonry existed before the time of Cromwell is as capable of demonstration, as that Cromwell himself ever existed. It is really entertaining to observe, what inconsistent and opposite opinions are formed upon the same subject. According to one writer, free masonry was invented and employed by the adherents of the king; according to another, it was devised by the friends of the parliament. In the opinion of some it originated among the Jesuits, who used it for the promotion of their spiritual tyranny and superstition; while others maintain, that it arose among a number of unprincipled sceptics, who employed it for destroying the spiritual tyranny and superstition of the Jesuits!

73. It was about this time, according to Dr Robison, that free masonry was introduced among the continental kingdoms. After James II. of England had abdicated the throne, and taken refuge in France with several of his adherents, it is probable that they would communicate additional spirit to the French lodges; but that the English refugees were the first who exported masonry from Britain, or that they employed it for re-establishing the Stuart family on the English throne, it is impossible to prove. Such assertions Dr Robison has not only hazarded, but has employed them also as the foundation of defamatory conclusions, without adducing a single proof in their support. Notwithstanding the difficulty, however, of determining the precise period when the principles of free masonry were imported into France, it is manifest, from the universal consent of the continental lodges, that it was of British origin; and it is more than probable, that the French received it from Scotland about the middle of the 16th century, during the minority of Queen Mary. It is well known, that there was at that time a freer intercourse between Scotland and France than at any other period. Mary queen of Scots was then married to the heir-apparent of France; and Mary of Guise, sister to the French king, was at the same time regent of Scotland. In consequence of this intimate connection between the two kingdoms, French troops were sent to the assistance of the Scots, who, having resided many years in the kingdom, and habituated to the manners and customs of their allies, would naturally carry along with them into their native country, those customs which afforded them pleasure; and none we know could be more congenial to the taste and dispositions of Frenchmen, than the ceremonial observances of free masonry. But it is not upon these considerations merely that our opinion depends. It receives ample confirmation from a fact, of which Dr Robison seems to have been totally ignorant. In the year 1645, a particular jurisdiction for masons, called *maçonnerie*, or *masonry*, was established in France. All differences which related to the art of building, were decided by particular judges, who were called overseers of the art of masonry; and several counsellors were appointed for pleading the causes, which were referred to their decision (T). This institution has such a striking resemblance to the warden courts which existed in Scotland in the 16th century, art 65. that it must have derived its origin from these. In both of them, those causes only were decided which related to masonry, and overseers were chosen in both for bringing these causes to a decision (U). But as similar tribunals were held in no other part of the world, and as the warden courts were first established in Scotland, it is almost certain, that the French borrowed from the Scots the idea of their masonic tribunal, as well as free masonry itself, at that particular period when there was such a free communication between the two kingdoms. That the French received free masonry from Scotland, may be presumed also from the singular pre-eminence which was always given by foreigners to Scotish masonry, and from the degree of *Chevalier Maçon Ecossois*, which, as a mark of respect to Scotland, the French had added to the three symbolical degrees of masonry about the beginning of the 18th century. Had free masonry not been introduced into France till after the revolution in 1688, as Dr Robison affirms, it is wonderful how such a fact should have been so quickly forgotten; for it was unknown about 30 or 40 years afterwards, at what period the French received

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(Q) Proofs of Conspiracy, p. 21.

(R) Id. p. 99.

(S) Pivati Art. Liberi Muratori auvero Francs Maçons Venezia, quoted by Mr Clinch.

(T) Maçonnerie est aussi le nom d'une jurisdiction particulière pour les maçons: Elle se tient au palais à Paris, et les appellations sont portées au parlement: cette jurisdiction a été etablie en 1645. Ceux qui l'exercent sont appellés Generaux des Oeuvres de Maçonnerie de France. Ils connoissent de differends entre les œuvriers concernant le fait des batiments. La maçonnerie a des procureurs particulières, differens de ceux de parlement, qui cependant peuvent y plaider. Dictionnaire de Trevoux, vol. v. p. 23.

(U) See Appendix, N° ii.

received it from Britain; and, if the exiled family had employed free masonry, for overturning the Hanoverian succession, it is still more strange that such a circumstance should be unknown in a country, where concealment was certainly unnecessary. When any new custom is introduced into a nation, the time of its introduction may be remembered for 70 to 80 years by one individual, without being committed to writing; and, though it be not of sufficient importance, tradition will preserve it from oblivion for a much greater length of time. If free masonry, therefore, never existed in France till after the revolution in 1688, is it not absurd to suppose, that the period when such a singular institution was established, should be utterly forgotten at the distance of 30 or 40 years from its establishment, though, during that time, it was never persecuted by the French government?

Innovation upon free masonry in France.

74. But, at whatever period, and from whatever source free masonry was introduced into France, it assumed there a very remarkable form. The attachment of that people to innovation and external finery, produced the most unwarrantable alterations upon the principles and ceremonies of the order. A number of new degrees were created; the office-bearers of the craft were arrayed in the most splendid and costly attire; and the lodges were transformed into lecturing rooms, where the wiser brethren supported the most extravagant opinions, discussed the abstrusest questions in theology and political economy, and broached opinions hostile to the interests of true religion and sound government. In the other countries of the continent, similar innovations, in a greater or less degree, prevailed, while the British lodges preserved the principles of the craft in their primitive simplicity and excellence. Such dangerous innovations have not the smallest connection with the principles of free masonry. They are unnatural excrescences formed by a warm imagination, and fostered by the interference of designing men. Those who reprehend free masonry, therefore, for the changes which it underwent in the hands of foreigners, may throw equal blame upon religion, because it has been a cloak for licentiousness and hypocrisy; or, upon science, because it has been converted into an instrument of iniquity. The changes of which we have been treating, arose altogether from the political condition of the countries where they were made. In France, and the other kingdoms of Europe, where popery was the ecclesiastical establishment, or where absolute power was in the hands of their monarchs, the most slavish restraints were imposed upon the conduct and conversation of the people. None durst utter his own sentiments, or converse upon such metaphysical subjects as militated against the theology and politics of the times. Under such restraints speculative men, in particular, were highly dissatisfied. Those powers which heaven had bestowed, and on the exercise of which their happiness depended, were fettered by human laws, and that liberty of speech restrained which tyranny had no right to controul. For these reasons, the lodges were frequented by men of philosophical habits, who eagerly embraced an opportunity of publishing their sentiments, and discussing the favourite objects of their study, without dreading the threats of government, or the tortures of the inquisition. In this view, the lodges may be compared to little republics, enjoying the rational liberties of human nature, in the midst of an extensive empire, enslaved by despotism and superstition. In the course of time, however, that liberty was abused, and doctrines were propagated in the French and German lodges, which it is the duty and policy of every government to discourage and suppress. But these corruptions had by no means a necessary connection with free masonry: they arose wholly from the political condition of the continental kingdoms. In Britain, where the order subsisted much longer than in any other country, its history is stained by no glaring corruptions or offensive innovations; more attention was paid to the intrinsic value of the order, than to its external observances; and the British lodges had a greater resemblance to charitable meetings, than to pompous and splendid assemblies. Blessed with a free constitution, and the enjoyment of every liberty which does not approach to licentiousness, the British masons were under no temptation to introduce into their lodges religious and political discussions. The liberty of the press enables them to give the widest circulation to their opinions, however new or extravagant; and they are liable to no punishment, by publicly attacking the established religion of their country. The British lodges, therefore, have retained their primitive purity; they have been employed in no sinister cause; they have harboured in their bosom neither traitors, nor atheists, nor French philosophers.

Causes of the purity of the British lodges.

75. While the French were busily engaged in the decoration of their lodges, and in the invention of new degrees and trifling ceremonies, the masons in England were more wisely employed in extending the boundaries of the royal art. About the beginning of the 18th century, during the reign of Queen Anne, free masonry seems to have rapidly declined in the south of England. Four lodges only existed in the south, and few hopes could be entertained of revival, while the seat of the grand lodge was at such a distance as the city of York. In such circumstances the four lodges met in 1717, and, in order to give vigour to their declining cause, and advance the interests of the fraternity in the south, they elected themselves into a grand lodge, and chose Anthony Sayer, Esq. for their first grandmaster. Thus was instituted the grand lodge of England, which has now attained to such a pitch of prosperity and splendour. The motive which suggested this institution, was certainly laudable and useful; but every person must be aware, that the four lodges were guilty of a considerable impropriety in omitting to request the countenance of the grand lodge of York. Notwithstanding this negligence, the greatest harmony subsisted between the two grand lodges till 1734; and under the auspices of both, the order flourished in every part of the kingdom, but particularly in the south of England, where it had formerly been in such a languishing condition. In the year 1734, however, the grand lodge of England having granted constitutions to lodges within the district of York, without the consent of their grand lodge, incurred to such a degree the displeasure of the York masons, that the friendly intercourse which had formerly subsisted between them, was completely broken off; and the prosperity of the one was always viewed by the other with a suspicious eye. In 1739 also some trifling innovations upon the ancient customs of the order, having been imprudently sanctioned by the grand lodge of England, several of the old London

Institution of the grand lodge of England in 1717.

Masonry. masons were highly offended, and, after seceding from the grand lodge, and pretending to act under the York constitution, they gave themselves the appellation of *Ancient Masons*, while they attached to those connected with the grand lodge the odious appellation of *Moderns*, who, in their opinion, never existed till the year 1717. The ancient masons, after their secession, continued to hold their meetings, without acknowledging a superior, till the year 1772, when they chose for their grandmaster the duke of Athol, who was then grandmaster elect for Scotland. Since that period both the grand lodges of England have attained to a high degree of prosperity; but such is their mutual antipathy, that the members of the one have no correspondence or communion with those of the other. The Irish and Scotish masons, however, who seem rather to favour the ancients, hold communion with both the grand lodges, and are allowed to be present at all their meetings. It is much to be regretted, that such respectable bodies as the two grand lodges of England, should retard the progress of masonry by their mutual jealousies and dissensions. Schisms in societies generally arise from misconduct on both sides, which was certainly the case in the schisms under consideration. The moderns undoubtedly departed from their usual caution and propriety of conduct, by authorising the slightest innovations upon the ceremonies of an ancient institution. But the ancients have been guilty of a greater impropriety by being the active promoters of the schism; and still more, by holding up the moderns to the ridicule of the public. If these errors, however, were mutually acknowledged, and buried in oblivion, that breach would soon be repaired which has so long separated the two lodges, and which the Scotish and Irish masons have always regarded with pity and indignation.

Free masonry introduced into different parts of the world.

76. After the institution of the grand lodge of England in 1717, free masonry assumed a bolder and a more independent aspect. It was no longer confined to the British isles, or to the capital of France, but was destined to irradiate every portion of the globe; and while the grand lodges of Scotland and England contemplated with pleasure the propagation of the royal art, their diligence was fully rewarded by the gratitude and liberality of the foreign lodges, for the gift which they received.

Into the East Indies, America, Germany, Africa, &c.

77. In the year 1729 free masonry was introduced into the East Indies; and, in a short time after, a provincial grandmaster was appointed to superintend the lodges in that quarter. In 1730 the grand lodge of Ireland was instituted; lodges were erected in different parts of America; and a provincial deputation granted to M. Thuanus, for the circle of Lower Saxony. A patent was sent from England in 1731, to erect a lodge at the Hague, in which Francis Stephen, duke of Lorrain, and afterwards emperor of Germany, was initiated into the order; and provincial grandmasters were appointed for Russia, and Andalusia in Spain. In 1736 lodges were erected at Cape Coast, in Africa, and at Geneva; and provincial deputations were granted for Upper Saxony and the American islands. In 1738, a lodge was instituted at Brunswick, under the patronage of the grand lodge of Scotland, in which the late king of Prussia was initiated when prince royal. His majesty was so pleased with the maxims and ceremonies of the order, that he, ever afterwards, was its most zealous partizan, and even requested that a lodge should be established in the capital of his own dominions. In this lodge many of the German princes were initiated, who afterwards filled the office of grandmaster, with much honour to themselves, and advantage to the fraternity. Masonry.

Free masons persecuted in Holland.

78. But while free masonry flourished in these different parts of the world, and in many other places which it would be tedious to enumerate, it was doomed to undergo a variety of persecutions from the unfounded jealousies of a few despotic rulers, and the deep-rooted superstition of a few Catholic priests. These persecutions took their rise in Holland in the year 1735. The States-General were alarmed at the rapid increase of free masons, who held their meetings in every town under their government; and as they could not believe that architecture and brotherly love were their only objects, they resolved to discountenance their proceedings. In consequence of this determination, an edict was issued by government, stating, that though they had discovered nothing in the practices of the fraternity, either injurious to the interests of the republic, or contrary to the character of good citizens; yet, in order to prevent any bad consequences which might ensue from such associations, they deemed it prudent to abolish the assemblies of free masons. Notwithstanding this prohibition, a respectable lodge continued to meet privately at Amsterdam; but intelligence having been communicated to the magistrates, all the members were arrested and brought before the court of justice. At this tribunal, in presence of all the magistrates of the city, the masters and wardens boldly defended themselves; and declared upon oath, that they were loyal subjects, faithful to their religion, and zealous for the interests of their country; that free masonry was an institution venerable in itself, and useful to society; and that though they could not reveal the secrets and ceremonies of their order, they could assure the judges that they were contrary to the laws neither of God nor man, and that they would willingly admit into their order any individual in whom the magistrates could confide, and from whom they might receive such information as would satisfy a reasonable mind. In consequence of these declarations, the brethren were dismissed, and the town secretary requested to become a member of the fraternity. After initiation he returned to the court of justice, and gave such a favourable account of the principles and practice of the society, that all the magistrates became brethren of the order, and zealous patrons of free masonry.

Free masonry persecuted in France;

79. After free masonry had thus honourably triumphed over her persecutors in Holland, she had to contend in France with prejudices equally inveterate though less insuperable. Although many persons of distinction defended the fraternity, and expostulated with the court on the impropriety of severe measures, their assemblies were abolished in 1737, under the common pretext that some dreadful design was concealed beneath their inviolable secrets, hostile to religion, and dangerous to the kingdom. But when these ebullitions of party spirit and private malice had subsided, the prohibition of government was gradually forgotten, and the fraternity in France recovered their former prosperity and splendour.

and in Germany.

80. In Germany too, the tranquillity of the order was

Masonry. was disturbed by the intrigues of some ignorant females. Some German ladies, who possessed more curiosity than is common to their sex, were anxious to discover the secrets of free masonry. Having been baffled in all their attempts on the fickleness of their husbands, and the fondness of their admirers, they converted their curiosity into revenge, and attempted to inflame the mind of Maria Theresa, the empress queen, against the lodges in Vienna. Their attempt was in some measure successful, as they persuaded her to issue an order for surprising all the masons in the city when assembled in their lodges. This plan, however, was frustrated by the intervention of the emperor Joseph I. who being himself a mason, pledged himself for the good conduct of his brethren, and showed the ladies and their friends, that their charges against the order were false and defamatory.

Free masons persecuted in Italy,

81. When the flame of persecution is once kindled, its devastations are seldom confined to the spot where it originated. The example of one nation is urged as an excuse for the conduct of another; and like the storm on the sandy desert, its effects are ruinous in proportion to its progress. In Holland and France the hostility of the government against free masonry was soon disarmed. But when the flame reached the ecclesiastical states of Italy, its effects were more baneful and its duration more lengthened. In the year 1738, a formidable bull was thundered from the conclave, not only against free masons themselves, but against all those who countenanced a set of men who, in the opinion of his holiness, were enemies to the tranquillity of the state, and hostile to the spiritual interests of souls. This bull was followed by an edict dated 14th January 1739, in which the servitude of the galleys, the tortures of the rack, and a fine of 1000 crowns in gold, were threatened to persons of every description who breathed the infectious air of a masonic assembly. A few weeks afterwards a decree was issued by his holiness condemning a French book, entitled An Apology for the Society of Free Masons, and ordering it to be burnt by the ministers of justice, in one of the best frequented streets of Rome.

and in Holland.

82. In consequence of these enactments at Rome, the catholic clergymen in Holland attempted in 1740 to enforce obedience to the decrees of their superiors. In examining the religious qualifications of those who required a certificate to receive the holy sacrament, the priests took occasion to refuse the certificate to such as were free masons, and expelled them for ever from the communion table. Having exerted their authority in the expulsion of several respectable characters, the attention of the public was roused by such arbitrary proceedings, and after the publication of several pamphlets by the adherents of both parties, the states general interfered, and prohibited the exercise of that spiritual power, which, instead of suppressing immorality, had excited divisions among their fellow subjects.

Institution of the association of the mopses.

83. In order to preserve the order from that ruin to which it seemed fast approaching, several free masons of distinction in Germany who were friendly to the church of Rome, instituted a new association formed on the same principles, and proposing to itself the same object as free masonry. The members were denominated *mopses*, from the German word *mops*, signifying a young mastiff, which was deemed a proper emblem of the mutual fidelity and attachment of the brethren. But that they might preserve the mysteries of free masonry from such of the members as were not masons, they rejected from their ritual all the masonic signs and ceremonies; and in order to escape the vengeance of the church of Rome, they converted the oath of secrecy into a simple promise, and admitted women into their new association. The mopses were patronised by the most illustrious characters in Germany, and several princes of the empire were grand masters of the order. The hostility of the Roman see to the protestants in Germany induced the mopses to exclude them from their fraternity; but this was merely a pretence to deceive his holiness, for they afterwards admitted men of every religion and of every country. Masonry.

84. As the authority of the pope did not extend to Switzerland, free masonry flourished in that republic till 1741, when the council of Berne issued an edict prohibiting under the severest penalties the assemblies of free masons. No reason was assigned for this conduct, and no charges advanced against the order. The council of Berne are terrified for secret associations, and therefore they must oppress and persecute them. Not satisfied with abolishing the lodges in the republic, they decreed that every free mason must accuse himself before the magistrates of the district, that he must renounce his obligations to secrecy, and swear in the presence of the Almighty, to trample upon those engagements, which before the same Being they had sworn to revere. Such an instance of tyranny over the minds and consciences of men, is a remarkable fact in the history of a republic where the reformed religion had been practised from its infancy, and where free masons had always conducted themselves with exemplary propriety.

Free masonry persecuted in Scotland.

85. The persecutions which free masonry encountered were hitherto confined to the continent. The tide of religious frenzy, however, now rolled to the shores of Britain. In the year 1745, the Associate Synod attempted to disturb the peace of the fraternity; and had they been possessed of half the power of the church of Rome or the council of Berne, their proceedings, prompted by equal fanaticism, would have been marked with the same severity; but, fortunately for the order, their power extended only to the spiritual concerns of those delinquents who were of the same sect with themselves. In the beginning of the year 1745, an overture was laid before the synod of Stirling, stating that many improper things were performed at the initiation of masons, and requesting that the synod would consider whether or not the members of that order were entitled to partake in the ordinances of religion. The synod remitted this overture to all the kirk-sessions under their inspection, allowing them to act as they thought proper. In 1755, however, they appointed all their kirk-sessions to examine every person who was suspected to be a free mason, and to demand an explicit answer to any question which they might ask, concerning the administration of the mason oath. In the course of these examinations, the kirk session discovered, (for they seem hitherto to have been ignorant of it) that men who were not architects were admitted into the order. On this account the synod, in the year 1757, thought it necessary to adopt stricter measures. They drew up a list of questions, which they appointed every kirk-session to put to those under their charge. These questions related

Masonry. lated to what they thought were the ceremonies of free masonry; and those who refused to answer them were debarred from religious ordinances. The object of these proceedings was not, certainly, as is pretended, to make the abettors of the Associate Synod more holy and upright, by detaching them from the fraternity. This could have been effected without that species of examination which they authorised. The church of Rome were contented with dispersing the fraternity, and receiving its repentant members into their communion. The council of Berne went no farther than abolishing the society, and compelling the brethren to renounce their engagements, lest they should be inconsistent with the duties of citizens. But a synod of Scotish dissenters, who cannot imitate in these points the church of Rome and the council of Berne, must compel the free masons of their congregation to give them an account of those mysteries and ceremonies, which they durst not obtain by regular initiation.

Free masonry flourishes on the continent.

86. Notwithstanding these persecutions, free masonry flourished, and was in the highest estimation in Great Britain, France, Germany, and several other kingdoms of Europe. In 1743, it was exported from Scotland to Denmark; and the lodge which was then instituted is now the grand lodge of that kingdom. The same prosperity has attended the first lodge in Sweden, which was erected at Stockholm in 1754, under a patent from Scotland. In 1765, a splendid apartment was erected at Marseilles for the accommodation of the brethren. It was adorned with the finest paintings, representing the most interesting scenes that occur in the history of the Old and New Testament, and calculated to remind the spectator of his various duties as a man, a subject, and a Christian. The representation of Joseph and his brethren, of the Samaritan and Jew, of Lot and the Angels, must have reminded every brother of the beauty of charity and forgiveness, which are the first principles of masonry, as they are the first duties of man. The picture of Peter and the Apostles paying tribute to Cæsar, must have recalled to every individual his obligations, as a citizen, to revere and support the constituted authorities. And the representation of Job in his misfortunes, lifting up his hands to heaven, must have forced upon the minds of the most inconsiderate, this important reflection—that fortitude and resignation to the will of God are the duties of all in distress, and that the divine blessing will ultimately attend those who bear, without murmuring, the chastisements of their father, and preserve, amidst the severest trials, their patience and virtue unimpaired (x). These observations, apparently trifling, are important in one respect, as they show that the French lodges had not at that time fostered in their bosom the votaries of scepticism and disloyalty. The other lodges in France were at this time numerous and magnificent. The grand lodge contained about twenty offices, which were all filled by noblemen of the highest rank. They had provincial grand masters similar to those of Scotland, and the insignia and jewels of all those office-bearers, were as rich and splendid as the lodges where they assembled.

87. In the year 1767, a lodge under an English constitution was established at Berlin, under the appellation of *Le Royale York*, in honour of the duke of York, who was initiated into the fraternity by that lodge while he was travelling on the continent. In 1768, the free masons of Germany were authorised to hold their assemblies, by a charter granted by the king of Prussia, the elector of Saxony, and the queen of Hungary and Bohemia, and afterwards by the emperor of Germany himself. By another charter from England, in 1769, a lodge was erected at Brunswick, which, a short time after, received a provincial deputation from England, for superintending the lodges of Lower Saxony. In the year 1773, a compact was entered into between the grand lodge of England, under Lord Petre, and the grand lodge at Berlin, under the prince of Hesse Darmstadt, which had a few years before been duly erected into a grand lodge, at a meeting of the masters and wardens of twelve regular lodges. In this compact it was stipulated, that the grand lodge of Berlin should be acknowledged as the grand lodge of the whole empire of Germany, including the dominions of his Prussian majesty; that it should exercise no masonic power out of the empire of Germany, or within the district under the authority of the grand lodge of Brunswick; that the electorate of Hanover should be free to both the grand lodges in Germany; and that the contracting parties should unite their efforts to counteract all innovations in masonry, and particularly the proceedings of a set of masons in Berlin, who, under the denomination of *Stricte Observantiæ*, had annihilated their former constitutions, erected themselves into a grand lodge, and sanctioned very improper innovations upon the principles and ceremonies of the fraternity. This compact was highly approved of by the king of Prussia, who immediately erected the grand lodge of Berlin into a corporate body. In 1777, the king of Prussia was protector of all the masons in Germany. Ferdinand, duke of Brunswick and Lunenburgh, was grand master of all the united lodges in Germany; and the other offices were filled by the most able and illustrious princes of the empire. Under the auspices of such distinguished personages, and the jurisdiction of the grand lodges of Berlin and Brunswick, free masonry has flourished to the present day in that extensive empire.

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Charity schools erected by free masons.

88. In Germany, Denmark, and Sweden, charity-schools were erected by the lodges, for educating the children of free masons, whose poverty debarred them from this advantage. In that which was formed at Brunswick, they were instructed even in classical learning, and various branches of the mathematics; and were regularly examined by the duke of Brunswick, who rewarded the most deserving with suitable donations. At Eisenach several seminaries of this kind were established. The teachers were endowed with fixed salaries; and, in a short time after their institution, they had sent into the world 700 children, instructed in the principles of science, and the doctrines of Christianity. In 1771, an establishment of a similar kind was formed at Cassel, in which the children were maintained and educated till they could provide for themselves.

(x) For a further account of this building, see Smith's Use and Abuse of Free Masonry, p. 165.

Masonry.

selves. In 1773 the united lodges of Dresden, Leipsick, and Gorlitz, erected at Frederickstadt a seminary of learning for children of every denomination in the electorate of Saxony. The masonic subscriptions were so numerous that the funds of the institution were sufficient for its maintenance; and in the space of five years, above 1100 children received a liberal education. In the same year, an extensive workhouse was erected at Prague in which the children were not only initiated into the first principles of learning, but into those branches of the useful and fine arts which might qualify them for commercial and agricultural situations. It deserves to be remarked, that the founders of these institutions, amid their anxiety for the public prosperity, never neglected the spiritual interests of the children. They saw that early piety is the foundation of all that is useful and honourable in life; and that without this, speculative knowledge and practical skill are of little avail.—How inconsistent are such facts with those fabulous accounts of the German lodges, which have been published in England by a few party-men.

Free masonry persecuted in Portugal.

89. While these things were going on in Germany, the brethren in Portugal were exposed to the persecution of its bigotted rulers. Major François d'Alincourt, a Frenchman, and Don Oyres de Ornellas Pracao, a Portuguese nobleman, were in 1766 imprisoned by the governor of Madeira for their attachment to their order. Being afterwards carried to Lisbon, they were confined for fourteen months, till they were released by the generous intercession of the brethren in that city. In the following year several free masons were confined at Naples, but soon liberated by the intercession of foreign princes, and the eloquence of an Italian advocate.

90. Notwithstanding the persecutions which the fraternity experienced in Holland, free masonry was flourishing in that republic in 1779. At that time a compact was entered into between the grand lodge of Holland, held at the Hague, and that of England. In this compact it was stipulated that the grand lodge of Holland should be permitted to erect lodges within her territories, both at home and abroad, and to appoint provincial grand masters over each district. In consequence of this accession of power to the grand lodge of Holland, free masonry flourished, under its auspices, in the Dutch settlements in India, Africa, and South America.

Origin and history of the illuminati.

91. Let us now direct our attention to a new secret association which about this time arose in Germany, and which was imagined to have taken its rise from free masonry, and to have planned a diabolical conspiracy against every religious and political establishment in Europe. In 1775 the order of the illuminati was founded by Dr Adam Weishaupt, professor of canon law in the university of Ingolstadt. In this association speculative opinions were inculcated, which were certainly inconsistent with the principles of sound religion and social order. But that illuminism originated from free masonry; that it brought about the French revolution, or even planned any dangerous conspiracy, are circumstances for which the shadow of a proof has not yet been adduced. Dr Robison indeed expressly affirms, that illuminism "took its rise among the free masons, but was totally different from free masonry;" and by a deceitful anachronism, he represents Weishaupt as an active member in the German lodges, before he acquaints his readers that he was the founder of the illuminati, for no other reason than to make them believe that Weishaupt was a free mason before he planned his new association (Y). Now the case was very different indeed. Barruel himself asserts, "that it is a fact demonstrated beyond a doubt, that Weishaupt became a mason in 1777 only; and that two years before this, when he established illuminism, he was totally unacquainted with the mysteries of free masonry (Z)." Here then is an important fact which strikes at the root of all Dr Robison's reasoning against free masonry. Barruel maintains, that Weishaupt was not a mason till two years after the organization of his new institution; and Dr Robison allows, that illuminism was totally different from free masonry. The two institutions, therefore, were totally unconnected; for the members of the one were never admitted into the lodges of the other, without being regularly initiated into the mysteries of both. Upon these simple facts we would arrest the attention of every reader, and those in particular who have been swindled out of their senses, by the united exertions of a priest and a philosopher.

Masonry.

92. After Weishaupt had organized his institution, he exerted every nerve to disseminate its principles. For this purpose he became a free mason in 1777; and by means of emissaries, he attempted to circulate his opinions among the French and German lodges. In these attempts, indeed, he was sometimes successful. But it should be recollected by those who, on this account, calumniate free masonry, that the same objection may be urged against Christianity, because impostors have sometimes gained proselytes, and perverted the wavering minds of the multitude. These doctrines, however, were not merely circulated by Weishaupt in a few of the lodges, and taught at the assemblies of the illuminati. They were published to the world in the most fascinating form, by the French encyclopedists; and were inculcated in all the eloquence, with which some of the most celebrated philosophers on the continent could adorn them. It can only be said of Weishaupt, therefore, that he was not just such a determined infidel as Voltaire and his associates.—Such is a short, and it is hoped, an impartial view of the origin and progress of the illuminati. It may be now proper to attend to the causes from which this association arose, and the advantages and disadvantages which it may have engendered.

Causes from which illuminism rose.

93. About the middle of the eighteenth century the literati on the continent were divided into two great parties. The one may be considered as ex-jesuits, or adherents to the Catholic superstition, who were promoters of political and religious despotism, and inculcated the doctrines of non-resistance and passive obedience. The other party was composed of men who were friends to the reformed religion, enemies of superstition and fanaticism, and supporters of the absurd doctrine of the infinite perfectibility of the human mind. They were

(Y) Proofs of a Conspiracy, Introduction, p. 15. and p. 101.

(Z) Memoirs of Jacobinism, Part iii. Preliminary Observations, p. 15. and p. 12.

Masonry. dissatisfied with that slavery which was imposed by the despotism of the continental rulers, and the superstition of the church of Rome; and many of them entertained opinions adverse to the Christian religion, and to every existing form of government. Between these two parties there was a perpetual struggle for power. The ex-jesuits accused their opponents as heretics and promoters of jacobinism and infidelity; while the others were constantly exposing the intrigues of priests, and the tyranny of despots. To this latter class belonged Weishaupt and his associates, who instituted the order of the illuminati for no other purpose than to oppose those corrupted priests, who would have degraded them as Christians, and those tyrannical despots who have enslaved them as citizens. The collision of these parties was certainly productive of the greatest advantages: While the Jesuits restrained the inclination of one part of the community, to overrate the dignity of the human mind, and anticipate ideal visions of religious and political perfection; the illuminati counteracted those gloomy opinions which debase the dignity of our nature, which check the energies of the mind, and impose the most galling yoke of religious and political servitude.

94. After the French revolution, which, as Mounier has well shown, arose from other causes than those to which Barruel and Robison ascribe it, the plans of these parties were not carried on in Germany so systematically as before; and notwithstanding the fabrications with which Barruel has calumniated the lodges in that country, free masonry prevails to this day, respected by the most virtuous and scientific members of the community, and patronized by the most distinguished princes of the empire.

Respectability of free masons in Germany.

95. In Germany the qualifications for a free mason are great and numerous. No person is initiated into the order without the consent of every member of the lodge; and it frequently happens, that a German even is excluded by a single dissentient voice. On this account the lodges of that country are filled with persons of the first rank and respectability; and every thing is conducted with the greatest decorum and solemnity. As masonry is there held in the highest estimation, an Englishman will obtain an easier introduction to the chief nobility and literati of Germany in a mason lodge than in any other place; and will never repent of having been initiated into the order in his native country (A).

Masonry.

96. After the publication of the works of Barruel and Robison, the progress of free masonry in Britain was retarded by an act of parliament in 1799 for the suppression of seditious societies, by which the fraternity were virtually prohibited from erecting new lodges in the kingdom. But this act was not promoted by the calumnies of these writers. It became necessary from the political condition of the kingdom; and the exceptions which it contained in favour of free masons, completely prove that government never credited the reports of these alarmists, but placed the most implicit confidence in the loyalty and prudence of British masons. The private characters, indeed, as well as the public situations of those individuals who are now grand masters of the order, are a sufficient pledge to the legislature and the uninitiated public, that free masonry will preserve in these kingdoms its ancient purity and simplicity, and that it will ever continue to be the foe of despotism and oppression, the enemy of superstition and fanaticism, the promoter of civilization and good order, and the friend of true benevolence and unaffected piety.

M A S

Masora. MASORA, a term in the Jewish theology, signifying a work on the Bible, performed by several learned rabbins, to secure it from any alterations which might otherwise happen.

Their work regards merely the letter of the Hebrew text, in which they have, first, fixed the true reading by vowels and accents: they have, secondly, numbered not only the chapters and sections, but the verses, words, and letters of the text: and they find in the Pentateuch 5245 verses, and in the whole Bible 23,206. The masora is called, by the Jews, the *hedge or fence of the law*, because this enumeration of the verses, &c. is a means of preserving it from being corrupted and altered. They have, thirdly, marked whatever irregularities occur in any of the letters of the Hebrew text; such as the different size of the letters, their various positions and inversions, &c. and they have been fruitful in finding out reasons for these irregularities and mysteries in them. They are, fourthly, supposed to be the authors of the Keri and Chetibh, or the marginal corrections of the text in our Hebrew Bibles.

The text of the sacred books, it is to be observed, was originally written without any breaks or divisions into chapters or verses, or even into words; so that a whole book, in the ancient manner, was but one continued word; of this kind we have still several ancient manuscripts, both Greek and Latin. In regard, therefore, the sacred writings had undergone an infinite number of alterations, whence various readings had arisen, and the original was become much mangled and disguised, the Jews had recourse to a canon, which they judged infallible, to fix and ascertain the reading of the Hebrew text; and this rule they call *masora*, "tradition," from מסר, *tradidit*, as if this critique were nothing but a tradition which they had received from their forefathers. Accordingly they say, that when God gave the law to Moses at Mount Sinai, he taught him, first, the true reading of it; and, secondly, its true interpretation; and that both these were handed down by oral tradition, from generation to generation, till at length they were committed to writing. The former of these, viz. the true reading, is the subject of the masora; the latter, or true interpretation, that of the mishna and gemara.

Masora.

According

(A) Dr Render's Tour through Germany, Introduction to vol. i. p. 30. and 33. Dr Render maintains, that free masonry has greatly improved the manners and disposition of the Germans. See vol. ii. p. 200. *Note*.

Masora, Masque.

According to Elias Levita, they were the Jews of a famous school at Tiberias, about 500 years after Christ, who composed, or at least began, the masora; whence they are called *masorites*, and *masoretic doctors*. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which serve for vowels.

The age of the masorites has been much disputed, Archbishop Usher places them before Jerome; Capel, at the end of the fifth century; Father Morin, in the tenth century. Basnage says, that they were not a society, but a succession of men; and that the masora is the work of many grammarians, who, without associating and communicating their notions, composed this collection of criticisms on the Hebrew text. It is urged that there were masorites from the time of Ezra and the men of the great synagogue, to about the year of Christ 1030: and that Ben Asher and Ben Naphtali, who were the best of the profession, and who, according to Basnage, were the inventors of the masora, flourished at this time. Each of these published a copy of the whole Hebrew text, as correct, says Dr Prideaux, as they could make it. The eastern Jews have followed that of Ben Naphtali, and the western that of Ben Asher; and all that has been done since is to copy after them, without making any more corrections or masoretical criticisms.

The Arabs have done the same thing by their Koran that the masorites have done by the Bible; nor do the Jews deny their having borrowed this expedient from the Arabs, who first put it in practice in the seventh century.

There is a great and little Masora printed at Venice and at Basil, with the Hebrew text in a different character. Buxtorf has written a masoretic commentary, which he calls *Tiberius*.

MASQUE, or MASK, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition, either to preserve their complexion from the weather, or out of modesty to prevent their being known. Poppæa, wife of Nero, is said to be the first inventor of the *masque*; which she did to guard her complexion from the sun and weather, as being the most delicate woman, with regard to her person, that has been known.

Theatrical masques were in common use both among the Greeks and Romans: Suidas and Athenæus ascribe the invention of them to the poet Chœrilus, a contemporary of Thespis: Horace attributes them to Æschylus; but Aristotle informs us, that the real inventor, and consequently the time of their first introduction and use, were unknown. Brantome observes, that the common use of modern masques was not introduced till towards the end of the sixteenth century.

MASQUE is also used to signify any thing used to cover the face, and prevent a person's being known. The penitents of Lyons and Avignon hide their faces with large white veils, which serve them for masques.

The Iron MASQUE (*Masque de Fer*), or *Man with the Iron Masque*, a remarkable personage so denominated, who existed as a state prisoner in France during the latter part of the 17th century. As the circumstances of this person form a historical problem which has occasioned much inquiry, and given rise to many conjectures, as well as of late, in consequence of the destruction of the Bastile, excited in a particular manner the curiosity of the public, it shall be endeavoured to condense in this article the substance of every thing material that has been published on the subject. We shall first relate such particulars concerning this extraordinary prisoner as appear to be well authenticated; and shall afterwards mention the different opinions and conjectures that have been entertained with regard to his real quality, and the causes of his confinement. Masque.

I. The authenticated particulars concerning the *Iron Masque* are as follows: A few months after the death of Cardinal Mazarine, there arrived at the isle of Sainte Marguerite, in the sea of Provence, a young prisoner whose appearance was peculiarly attracting: his person was above the middle size, and elegantly formed, his mien and deportment were noble, and his manners graceful; and even the sound of his voice, it is said, had in it something uncommonly interesting. On the road he constantly wore a masque made with iron springs, to enable him to eat without taking it off. It was at first believed that this masque was made entirely with iron; whence he acquired the name of "the Man with the iron mask." His attendants had received orders to despatch him if he attempted to take off his masque or discover himself. He had been first confined at Pignerol, under the care of the governor M. de St Mars; and upon being sent from thence to Sainte Marguerite, he was accompanied thither by the same person, who continued to have the charge of him. He was always treated with the most marked respect: he was served constantly in plate; and the governor himself placed his dishes on the table, retiring immediately after and locking the door behind him. He *tu-to'yoit* (thee'd and thou'd) the governor; who, on the other hand, behaved to him in the most respectful manner, and never wore his hat before him, nor sat down in his presence unless he was desired. The marquis de Louvoisis, who went to see him at St Marguerite, spoke to him standing, and with that kind of attention which denotes high respect.

During his residence here, he attempted twice, in an indirect manner, to make himself known. One day he wrote something with his knife on a plate, and threw it out of his window towards a boat that was drawn on shore near the foot of the tower. A fisherman picked it up and carried it to the governor. M. de St Mars was alarmed at the sight; and asked the man with great anxiety, whether he could read, and whether any one else had seen the plate? The man answered, that he could not read, that he had but just found the plate, and that no one else had seen it. He was, however, confined till the governor was well assured of the truth of his assertions.—Another attempt to discover himself proved equally unsuccessful. A young man who lived in the isle, one day perceived something floating under the prisoner's window; and on picking it up, he discovered it to be a very fine shirt written all over. He carried it immediately to the governor; who, having looked at some parts of the writing, asked the lad, with some appearance of anxiety, if he had not had the curiosity to read it? He protested repeatedly that he had not; but two days afterwards, he was found dead in his bed.

The *Masque de Fer* remained in this isle till the year 1698, when M. St Mars being promoted to the government of the Bastile, conducted his prisoner to that fortress. In his way thither, he stopt with him at his estate

Masque. estate near Paltcau. The Masque arrived there in a litter, surrounded by a numerous guard on horseback. M. de St Mars atc at the same table with him all the time they resided at Palteau; but the latter was always placed with his back towards the windows; and the peasants, who came to pay their compliments to their master, and whom curiosity kept constantly on the watch, observed that M. dc St Mars always sat opposite to him with two pistols by the side of his plate. They were waited on by one servant only, who brought in and carried out the dishes, always carefully shutting the door both in going out and returning. The prisoner was always masked, cven when he passed through the court; but the people saw his teeth and lips, and also observed that his hair was gray.—The governor slept in the same room with him, in a second bed that was placed in it on that occasion. In the course of their journey, the Iron Mask was one day heard to ask his keeper whether the king had any design on his life? "No, prince," he replied; "provided that you quietly allow yourself to be conducted, your life is perfectly secure."

The stranger was accommodated as well as it was possible to be in the Bastile. An apartment had been prepared for him by order of the governor before his arrival, fitted up in the most convenient style; and every thing he expressed a desirc for was instantly procured him. His table was the best that could be provided; and he was ordered to be supplied with as rich clothes as he desired: but his chief tastc in this last particular was for lace, and for linen remarkably fine. It appears that he was allowed the use of such books as he desired, and that he spent much of his time in reading. He also amused himself with playing upon the guitar. He had the liberty of going to mass; but was then strictly forbid to speak or uncover his face: orders were even given to the soldiers to firc upon him if he attempted either; and their pieces were always pointed towards him as he passed through the court. When he had occasion to sec a surgeon or a physician, he was obliged, under pain of death, constantly to wcar his mask. An old physician of the Bastile, who had often attended him when he was indisposed, said, that he never saw his face, though he had frequently examined his tongue, and different parts of his body; that there was something uncommonly interesting in the sound of his voice; and that he never complained of his confinement, nor let fall from him any hiut by whieh it might be guessed who he was. It is said that he often passed the night in walking up and down his room.

This unfortunate prince died on the 19th of November 1703, after a short illness; and was interred next day in the burying-place of the parish of St Paul. The expence of his funeral amounted only to forty livres. The name given him was *Marchiali*: and even his age, as well as his real name, it seemed of importance to conceal; for in the register made of his funeral, it was mentioned that he was about forty years old; though he had told his apothecary, some time before his death, that he thought he must be sixty.—It is a well-known fact, that immediately after the prisoner's death, his apparel, linen, clothes, mattresses, and in short every thing that had been used by him, were burnt; that the walls of his room were scraped, the floor taken up, evidently from the apprehension that he might have found means of writing any thing that would have discovered who he was. Nay, such was the fear of his having left a letter or any mark which might lead to a discovery, that his plate was melted down; the glass was taken out of the window of his room and pounded to dust; the window-frame and doors burnt; and the ceiling of the room, and the plaster of the inside of the chimney, taken down. Several persons have affirmed, that the body was buried without a head; and Monsieur de Saint Foix informs us *, that "a gentleman having bribed the sexton, had the body taken up in the night, and found a stone instead of the head." Masque.

* In his *Essais Historiques.*

The result of these extraordinary accounts is, that the Iron Masque was not only a person of high birth, but must have been of great consequence; and that his being concealed was of the utmost importance to the king and ministry. We come now, therefore, to notice,

II. The opinions and conjectures that have been formed concerning the real name and condition of this remarkable personage. Some have pretended that he was the duke of Beaufort; others, that he was the count dc Vermandois, natural son to Louis XIV. by the duchess de la Valliere. Some maintain him to have been the duke of Monmouth, natural son of Charles II. of England by Lucy Walters; and others say, that he was Gerolami Magni, minister to the duke of Modena.

Besides these conjectures, none of which possesses sufficient probability to entitle them to consideration, a fifth has been advanced; namely, That the Iron Masque was a son of Anne of Austria, queen to Louis XIII. and consequently that he was a brother of Louis XIV.; but whether a bastard brother, a brother-german, or a half-brother, is a question that has given rise to three several opinions, which we shall state in the order of time in which the respective transactions to which they allude happened.

1. The first opinion is, that the queen proved with child at a time when it was evident it could not have been by her husband, who for some months before, had never been with her in private. The supposed father of this child is said by some to have been the duke of Buckingham, who came to France in May 1625, to conduct the Princess Henrietta, wife of Charles I. to England. The private letters and memoirs of those times speak very suspiciously of the queen and Buckingham; his behaviour at Amiens, whither the queen and queen-mother accompanied the princess in her way to Boulogne, *occasioned much whispering*: notwithstanding the pains that have been taken by La Porte in his *Memoires* to excuse his mistress, it appears that the king, on this occasion, was extremely offended at her, and that it required all the influence and address of the queen-mother to effect a reconciliation. It is said, that this child was privately brought up in the country; that when Mazarine became a favourite, he was intrusted with the care of him; and that Louis XIV. having discovered the secret on the death of the cardinal, thought it necessary to confine him in the manner that has been related.

But it may be observed, that this secret could scarcely have escaped the vigilance of the cardinal de Richlieu; *Hist. of the Bastile*, No 6. p. 343.

Masque. Richlieu; and it is not improbable, that a minister so little scrupulous, if inclined to save the honour of a queen, would have removed a child, who, if he lived, might have been made use of to disturb the tranquillity of the kingdom. After this supposed birth, the queen had frequent quarrels with the king, and what was more dangerous, with the cardinal; who even used every means in his power to inquire into her most private transactions. It was on a memorable occasion of this kind, that her servant La Porte was thrown into the Bastile; and it can scarcely be imagined she would have had the firmness she then displayed, while conscious of so much guilt, and under the risk of having it discovered. The prisoner with the masque appears, by several accounts, to have been a youth of a handsome figure in the year 1661; and in 1703, when he died, to have been above sixty; but had he been a son of Buckingham, he would have been about thirty-six in 1661, when he could not be said to have been a youth; and in November 1703, about seventy-eight.

2. The second opinion is, that he was the twin brother of Louis XIV. born some hours after him. This first appeared in a short anonymous work published without date, and without the name of place or printer. It is therein said, "Louis XIV. was born at St Germains en Laye, on the 5th of September 1638, about noon; and the illustrious prisoner, known by the appellation of the *Iron Masque*, was born the same day, while Louis XIII. was at supper. The king and the cardinal, fearing that the pretensions of a twin brother might one day be employed to renew those civil wars with which France had been so often afflicted, cautiously concealed his birth, and sent him away to be brought up privately. Having but an imperfect knowledge of the circumstances that followed, I shall say nothing more, for fear of committing errors; but I firmly believe the fact I have mentioned; and time will probably prove to my reader, that I have ground for what I have advanced."

This opinion has been more noticed since the publication of a work called *Memoires du Marechal Duc de Richlieu*, written by the abbé Soulavie; concerning which it may be proper to premise, that the present duke of Richlieu, son of the marechal, disavows this work, while the abbé Soulavie, who had been employed by the marechal, insists on the authenticity of his papers (A). He informs us that the duke of Richlieu was the lover of Mademoiselle de Valois, daughter of the regent duke of Orleans, and afterwards duchess of Modena, who in return was passionately fond of him; that the regent had something more than a paternal affection for his daughter; and that, though she held his sentiments in abhorrence, the duke of Richlieu made use of her influence with her father to discover the secret of the prisoner with the masque; that the regent, who had always observed the most profound silence on this subject, was at last persuaded to intrust her with a manuscript, which she immediately sent to her lover, who took a copy of it. This manuscript is supposed to have been written by a gentleman on his deathbed, who had been the governor of the prisoner. The following is an extract of it, from what the abbé Soulavie has told us. Masque.

"The birth of the prisoner happened in the evening of the 5th of September 1638, in presence of the chancellor, the bishop of Meaux, the author of the manuscript, a midwife named Peronéte, and a sieur Honorat. This circumstance greatly disturbed the king's mind; he observed that the Salique law had made no provision for such a case; and that it was even the opinion of some, that the last born was the first conceived, and therefore had a prior right to the other. By the advice of Cardinal de Richlieu, it was therefore resolved to conceal his birth, but to preserve his life, in case by the death of his brother it should be necessary to avow him. A declaration was drawn up, and signed and sworn to by all present, in which every circumstance was mentioned, and several marks on his body described. This document being sealed by the chancellor with the royal seal, was delivered to the king; and all were commanded and took an oath never to speak on the subject, not even in private and among themselves. The child was delivered to the care of Madame Peronéte the midwife, to be under the direction of Cardinal de Richlieu, at whose death the charge devolved to Cardinal de Mazarine. Mazarine appointed the author of the manuscript his governor, and intrusted to him the care of his education. But as the prisoner was extremely attached to Madame Peronéte, and she equally so to him, she remained with him till her death. His governor carried him to his house in Burgundy, where he paid the greatest attention to his education.

"As the prisoner grew up, he became impatient to discover his birth, and often importuned his governor on that subject. His curiosity had been roused by observing that messengers from the court frequently arrived at the house: and a box, containing letters from the queen and the cardinal, having one day been inadvertently left out, he opened it, and saw enough to guess at the secret. From that time he became thoughtful and melancholy; 'which (says the author) I could not then account for. He shortly after asked me to get him a portrait of the late and present king; but I put him off by saying that I could not procure any that were good. He then desired me to let him go to Dijon; which I have known since was with an intention of seeing a portrait of the king there, and of going secretly to St John de Lus, where the court then was on occasion of the marriage with the infanta. He was beautiful; and love helped him to accomplish his wishes. He had captivated the affections of a young housekeeper, who procured him a portrait of the king. It might have served for either of the brothers; and the discovery put him into so violent a passion, that he immediately came to me with the portrait in his hand, saying, *Voila mon frere, et voila que je suis*, showing me at the same time a letter of the cardinal de Mazarine that he had taken out of the box.' Upon this discovery his governor immediately sent an express to court

(A) A letter from the duke of Richelieu, and answer from the abbé Soulavie, appeared in the Journal de Paris.

Masque. court to communicate what had happened, and to desire new instructions; the consequence of which was, that the governor and the young prince under his care were arrested and confined."

This memoir, real or fictitious, concludes with saying, "I have suffered with him in our common prison: I am now summoned to appear before my judge on high; and for the peace of my soul I cannot but make this declaration, which may point out to him the means of freeing himself from his present ignominious situation, in case the king his brother should die without children. Can an extorted oath compel me to observe secrecy on a thing so incredible, but which ought to be left on record to posterity."

3. The third opinion is, that he was a son of the queen by the cardinal de Mazarine, born about a year after the death of her husband Louis XIII.; that he was brought up secretly; and that soon after the death of the cardinal, which happened on the 9th of March 1661, he was sent to Pignerol. To this account Father Griffet * objects, "that it was needless to masque a face that was unknown; and therefore that this opinion does not merit discussion." But in answer it has been observed, That the prisoner might strongly resemble Louis XIV. which would be a sufficient reason to have him masked. This opinion is supposed to have been that entertained by Voltaire, who asserts his thorough knowledge of the secret, though he declined being altogether explicit. The abbé Soulavie, author of Memoirs of the Marechal de Richlieu, speaking on this subject, says, "That he once observed to the marechal, that he certainly had the means of being informed who the prisoner was; that it even seemed that he had told Voltaire, who durst not venture to publish the secret; and that he at last asked him, whether he was not the elder brother of Louis XIV. born without the knowledge of Louis XIII.? That the marechal seemed embarrassed, but afterwards said, that he was neither the bastard brother of Louis XIV. nor the duke of Monmouth, nor the count of Vermandois, nor the duke of Beaufort, as different authors had advanced; that their conjectures were nothing but reveries: but added, that they however had related many circumstances that were true; that in fact the order was given to put the prisoner to death if he discovered himself; and that he finished the conversation by saying, All I can tell you on the subject is, that the prisoner was not of such consequence when he died at the beginning of the present century as he had been at the beginning of the reign of Louis XIV. and that he was shut up for important reasons of state." The abbé Soulavie tells us, that he wrote down what had been said, and gave it to the marechal to read, who corrected some expressions. The abbé having proposed some further questions, he answered. "Read what Voltaire published last on the subject of the prisoner with the masque, especially at the end, and reflect on it."—The passage of Voltaire alluded to, is as follows:

"The *man with the masque*, (says he), is an enigma of which every one would guess the meaning. Some have said that it was the duke of Beaufort; but the duke of Beaufort was killed by the Turks in the defence of Candy in 1669, and the prisoner with the masque was at Pignerol in 1661. Besides, how could the duke of Beaufort have been arrested in the midst of his army, and brought to France, without any one knowing it? and why confine him? and why that masque?—Others have dreamed that he was the count de Vermandois, natural son of Louis XIV. who died publicly at the army in 1683 of the smallpox, and was buried at the little town of Aire and not Arras; in which Father Griffet was mistaken, but in which to be sure there is no great harm. Others have imagined, that it was the duke of Monmouth, who was beheaded publicly in London in the year 1685. But for this he must have risen again from the dead, and he must have changed the order of time, and placed the year 1662 in the room of the year 1685. King James, who never forgave any one, and who on that account deserved all that happened to him, must have pardoned the duke of Monmouth, and got another to die in his stead, who perfectly resembled him. This Sosia must first have been found, and then he must have had the goodness to let his head be cut off in public, to save the duke of Monmouth. It was necessary that all England should be mistaken; and that King James should beg of Louis XIV. to be so obliging as to be his gaoler; that Louis XIV. after having shown this trifling piece of civility to King James, should not have been wanting in the same attention to his friend King William and to Queen Anne (with both of whom he was engaged in war), and to please them, retained the dignity of gaoler, with which James had honoured him. Masque.

"All these illusions being dissipated, it then remains to know who this prisoner was, and at what age he died. It is clear, that if he was not permitted to cross the court of the Bastile, or to speak to his physician, except covered with a masque, it must have been from the apprehension that his features and countenance might have discovered some resemblance. He could show his tongue but not his face. He said himself to the apothecary of the Bastile, a few days before his death, that he believed he was about 60. Mr Marsoban, who was son-in-law to this apothecary, and surgeon to the marechal de Richlieu, and afterwards to the regent duke of Orleans, told me this frequently. Why give him an *Italian* name?—They always called him *Marchiali*. He who writes this article perhaps knows more than Father Griffet, but he will say nothing farther."

This opinion has been lately resumed, illustrated, and enforced, by M. de Saint Mihiel, in a work entitled *Le Veritable Homme*, &c. "The real Man with the Iron Masque." The author, in support of his idea, attempts to prove that Anne of Austria and Cardinal Mazarine were married. This, says he, the duchess of Orleans assures us of in three of her letters. In the first, dated Sept. 13. 1713, she expresses herself as follows: "Old Beauvais, who was first lady of the bedchamber to the queen dowager, was acquainted with the secret of the ridiculous marriage; this rendered it necessary for the queen to do every thing that her confidant wished; and this circumstance has given rise in this country to an extension of the rights of first ladies of the bedchamber." In the second of these letters, dated Nov. 2. 1717, she says, "The queen-mother, widow of Louis XIII. did worse than love Cardinal Mazarine; she married him, for he was not

* *Traité de la verité de l'Histoire*, p. 318. n.

Masque. a priest: he was not even in orders; and who could have hindered her? He was most horribly tired of the good queen-mother, and lived on very bad terms with her, which is the reward that people deserve for entering into such marriages." In her third letter, dated July 2. 1719, speaking of the queen, the duchess says, "She was perfectly easy respecting Cardinal Mazarine; he was not a priest, and therefore nothing could prevent their being married. The secret passage through which the cardinal went every evening to the queen's apartment is still to be seen at the Palais royal." Among other proofs besides the above, which M. de St Mihiel brings to substantiate this marriage, he observes, that Mazarine held all councils of state in his apartment whilst he was shaving or dressing; that he never permitted any person to sit down in his presence, not even the chancellor nor marshal de Villeroi; and that while they were deliberating with him on state affairs, he would be often playing with his monkey or linnet. What man (continues the author) would have subjected to such humiliations a chancellor, who holds the first office in the kingdom since that of constable has been suppressed, and a marshal who was governor to the king, had he not been in reality a sovereign himself, in virtue of his being husband to the queen-regent? He therefore concludes, that the man with the iron masque was son to Anne of Austria and Cardinal Mazarine; and endeavours to justify this assertion by a variety of conjectural proofs. Of some of these we shall give a short sketch:—

1. No prince, or person of any consideration, after the year 1644, at which time the man with the iron masque was born, until the time when his existence was known, disappeared in France. This personage, therefore, was not a prince or great lord of France known at that time.

2. The man with the iron masque was not a foreigner; for foreigners, even of the highest distinction, did not at that period study the French language in such a manner as to attain so great perfection in it as to pass for Frenchmen. If this prisoner had spoken with the least foreign accent, the officers, physicians, surgeons, apothecaries, confessors, and others employed in the prisons where he was, and especially the prisoners with whom he conversed at St Margaret, would not have failed to discover it. From all this M. de St Mihiel infers that he must have been a Frenchman.

3. The existence of the man with the iron masque has been known for upwards of 90 years. Had any person of high rank disappeared at an anterior period, his friends, relations, or acquaintances, would not have failed to claim him, or at least to suppose that he was the man concealed by this masque. But no one disappeared, nor was any one claimed: the man with the iron masque was therefore a person unknown.

4. This man was not torn away from society on account of any criminal action; for when he was arrested, it was foreseen that he would cause much embarrassment, and occasion great expences. He was therefore not a criminal, else means would have been pursued to get rid of him; and consequently all the importance of his being concealed was attached solely to his person.

5. This stranger must have been a person of very high birth; for the governor of the prison, St Mars, behaved always to him with the greatest respect. Masque.

6. Louis XIII. played on the guitar; Louis XIV. did the same in a very masterly manner; and the man with the iron masque played also on that instrument: which gives us reason to believe that his education was directed by the same persons who had presided over that of Louis XIV. and who appear to have been the particular choice of Anne of Austria.

7. This stranger died on the 19th of November 1703; and a few days before his death, he told the apothecary of the Bastile, that he believed he was about 60 years of age. Supposing that he was then 59 and a half, he must have been born towards the end of May 1644; and if he was 60 wanting three months, he must have been born in the end of August, or the beginning of September, of the same year; a period when the royal authority was in the hands of Anne of Austria, but in reality exercised more by Mazarine than by her. "I have already proved (continues the author), that from the first day of the regency of Anne of Austria, the greatest friendship, and even intimacy, subsisted between this princess and the cardinal; that these sentiments were changed into a mutual love, and that they were afterwards united by the bonds of marriage. They might, therefore, well have a son about the month of September 1644, as Louis XIII. had been then dead more than 15 months, having died on the 15th of May the year preceding. But nothing of what I have related, or of what has been written, and acknowledged as fact, respecting the man with the iron masque, can be applied, except to a son of Mazarine and Anne of Austria. The man with the iron masque, was indebted, therefore, for his existence to Cardinal Mazarine and the regent widow of Louis XIII."—To account for the manner in which the queen was able to conceal her pregnancy and delivery, Madame de Motteville is quoted: who relates, under the year 1644, that Anne of Austria quitted the Louvre, where she had resided for 29 years, because her apartments there displeased her: that she went to reside at the Palais Royal, which Richlieu, when he died, bequeathed to the deceased king: that when she first occupied this lodging, *she was dreadfully afflicted with the jaundice:* that the physicians ascribed this disorder to her dejection and application to business, which gave her much embarrassment: but that being cured of her melancholy, as well as of her malady, she resolved to think only of enjoying tranquillity; which she did, by communicating to her minister the burden of public affairs.

8. As it is necessary that some name should be given to every man, in order to distinguish him from another, that of *Marchiali* was given to the man with the iron masque: a name which evidently shows, that it had been invented by an Italian. [Cardinal Mazarine was a native of Piscina in the Abruzzo.]

9. Anne of Austria was remarkably delicate respecting every thing that touched her person. It was with great difficulty that cambric could be found fine enough to make shifts and sheets for her. Cardinal Mazarine once rallying her on this subject, said, *That if she should be damned, her punishment in hell would be to sleep in Holland sheets.* The predominant taste of the man with the iron masque, was to have lace and linen

Masque. of the most extraordinary fineness. "Who (says the author) does not perceive, in this similarity of tastes, the maternal tenderness of Anne of Austria, who would have thought her son a great sufferer had he not been indulged with fine linen?"

"Louis XIII. (continues M. de St Mihiel) was a husband of a gloomy disposition, and an enemy to pleasure: while the queen, on the contrary, was fond of social life; and introduced at the court of France, especially after she became free, that ease and politeness which distinguished it under Louis XIV. from all the other courts of Europe. Louis XIII. had also a disagreeable coutenance, and a breath so offensive, that it was a punishment for Richlieu to remain near him. It is clear, therefore, that she could not be much pleased with such a husband. When she became regent of the kingdom by the king's death, which happened on the 14th of May 1643, as she had not enjoyed that happiness which arises from a close union of hearts, it will not appear extraordinary that she should indulge the affection she entertained for Cardinal Mazarine, and that she should marry him. Every circumstance that could tend to favour such a marriage will be found united in her situation. She was at a distance from her family; absolute mistress of all her actions; and had, besides, a heart formed for love. Mazarine, though a cardinal, had never entered into orders; he gave out that he was descended from a great family; he was handsome and well made; he was of a mild, insinuating disposition, and remarkably engaging in conversation; and his office, as prime minister, afforded him every opportunity of visiting and conversing with the queen whenever he thought proper. Is it, therefore, so very astonishing, that, with so many advantages he was able to captivate the queen so far as to induce her to marry him? Such a marriage was not, indeed, according to the usual course of things. Yet it was not without many precedents, particularly among sovereigns of the other sex, who had given their hands to persons of inferior rank. As the women, however, are not forgiven so readily as the men for entering into such marriages, Anne of Austria kept hers a secret from this motive, and because she would have been in danger of losing the regency of the kingdom had it been known."

The reasoning of M. de St Mihiel is both ingenious and plausible; though the probability of the account is somewhat diminished by considering what must have been the queen's age at this period, after she had been Louis's wife for 29 years before his death.—The account immediately preceding, without this objection, seems abundantly credible. But, whether, upon the whole, either of them can be received as decisive, or whether the mystery of the iron masque remains still to be unravelled, we must leave to the reader to determine.

Masque, in *Architecture*, is applied to certain pieces of sculpture, representing some hideous forms, grotesque, or satyrs faces, &c. used to fill up and adorn vacant places, as in friezes, the pannels of doors, keys of arches, &c. but particularly in grottos.

MASQUERADE, or Mascarade, an assembly of persons masqued or disguised, meeting to dance and divert themselves. This was much in use with us, and has been long a very common practice abroad, especially in carnival time. The word comes from the Italian *mascarata*, and that from the Arabic *mascara*, which signifies "raillery, buffoonery." Granacci, who died in 1543, is said to have been the first inventor of masquerades. Masque ‖ Mass.

MASRAKITHA, a pneumatic instrument of music among the ancient Hebrews, composed of pipes of various sizes, fitted into a kind of wooden chest, open at the top, and stopped at the bottom with wood covered with a skin. Wind was conveyed to it from the lips, by means of a pipe fixed to the chest: the pipes were of lengths musically proportioned to each other, and the melody was varied at pleasure, by stopping and unstopping with the fingers the apertures at the upper extremity. See Plate CCXCVIII.

MASS, in *Mechanics*, the matter of any body cohering with it, i. e. moving and gravitating along with it. In which sense, *mass* is distinguished from bulk, or volume, which is the expansion of a body in length, breadth, and thickness. The mass of any body is rightly estimated by its weight; and the masses of two bodies of the same weight are in a reciprocal ratio of their bulks.

Mass, *Missa*, in the church of Rome, the office or prayers used at the celebration of the eucharist; or in other words consecrating the bread and wine into the body and blood of Christ, and offering them so transubstantiated as an expiatory sacrifice for the quick and the dead. As the mass is in general believed to be a representation of the passion of our blessed Saviour, so every action of the priest, and every particular part of the service, is supposed to allude to the particular circumstances of his passion and death.

Nicod, after Baronius, observes that the word comes from the Hebrew *missach* (*oblatum*); or from the Latin *missa missorum*; because in the former times, the catechumens and excommunicated were sent out of the church, when the deacons said *Ite, missa est*, after sermon and reading of the epistle and gospel; they not being allowed to assist at the consecration. Menage derives the word from *missio*, "dismissing:" Others from *missa*, "missing, sending;" because in the mass, the prayers of men on earth are sent up to heaven.

The general division of masses consists in high and low. The first is that sung by the choristers, and celebrated with the assistance of a deacon and sub-deacon; low masses are those in which the prayers are barely rehearsed without singing.

There are many different or occasional masses in the Romish church, some of which have nothing peculiar but the name: such are the masses of the saints; that of St Mary of the snow, celebrated on the fifth of August; that of St Margaret, patroness of lying-in-women; that of the feast of St John the Baptist, at which are said three masses; that of the innocents, at which the gloria in excelsis and the hallelujah are omitted, and it being a day of mourning, the altar is of a violet colour. As to ordinary masses, some are said for the dead, and, as is supposed, contribute to fetch the soul out of purgatory: at these masses the altar is put in mourning, and the only decorations are a cross in the middle of six yellow wax-lights; the dress of the celebrant, and the very mass-book, are black; many parts of the office are omitted, and the people are dismissed without the benediction.

If

Massa || Massachusetts.

If the mass be said for a person distinguished by his rank or virtues, it is followed with a funeral oration; they erect a *chapelle ardente*, that is, a representation of the deceased with branches and tapers of yellow wax, either in the middle of the church, or near the deceased's tomb, where the priest pronounces a solemn absolution of the deceased. There are are likewise private masses said for stolen or strayed goods or cattle, for health, for travellers, &c. which go under the name of *votive masses*. There is still a further distinction of masses denominated from the countries in which they were used; thus the Gothic mass, or *missa mosarabum*, is that used among the Goths when they were masters of Spain, and which is still kept up at Toledo and Salamanca; the Ambrosian mass is that composed by St Ambrose, and used only at Milan, of which city he was bishop; the Gallic mass, used by the ancient Gauls; and the Roman mass, used by almost all the churches in the Romish communion.

Mass of the Presanctified (*missa præsanctificatorum*), is a mass peculiar to the Greek church, in which there is no consecration of the elements; but after singing some hymns, they receive the bread and wine which was before consecrated. This mass is performed all Lent, except on Saturdays, Sundays, and the annunciation. The priest counts upon his fingers the days of the ensuing week on which it is to be celebrated, and cuts off as many pieces of bread at the altar as he is to say masses; and after having consecrated them, steeps them in wine, and then puts them in a box; out of which, upon every occasion, he takes some of it with a spoon, and putting it on a dish sets it upon the altar.

MASSA, a town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, with a bishop's see; seated on a mountain near the sea, in E. Long. 10. 0. N. Lat. 43. 5.

MASSA, an ancient, populous, and handsome town of Italy, and capital of a small territory of the same name, with the title of a principality, and a strong castle. It is famous for quarries of fine marble, and is situated in E. Long. 14. 23. N. Lat. 40. 40.

MASSACHUSETTS, one of the United States of North America. This is one of the five states included under the name of NEW ENGLAND; and a pretty full account having been given, under that article, of the situation, soil, productions and population of the whole, we shall confine ourselves here, to the leading facts connected with this particular state.

Massachusetts has the state of New York on the west, the sea on the east, New Hampshire and Vermont on the north, and Connecticut and Rhode Island on the south. Its area is about 6250 square miles. It is rather a hilly country, and not generally fertile, though some of the valleys are very rich. The climate is variable and the winter long. The mean temperature of the year is 49°, though the latitude is only 42. The annual quantity of rain at Cambridge is 47½ inches; the number of rainy days in the year, 88.

This is the most densely peopled state in the Union, the population in 1810, being 472,040, which is about 75 persons to each square mile. There are no slaves in this state. The principal town is Boston, which in 1818 had a population of 40,000 (Fearon's Travels). It is a place of great commercial activity; its tonnage in 1815 was 137,008. The tonnage of the whole state was 454,205, which was greater than that of any other state in the Union. The exports, in 1817, were 11,927,997 dollars, of which 5,908,416 were domestic, and 6,009,581 foreign produce. The whale fishery is a leading branch of this commerce. In 1811 there were 1200 sailors in this trade, belonging to the small island of Nantucket, which is its principal seat. Ship-building is carried on in this state to a great extent. The whole value of the manufactures for the year 1810 was 18,536,933 dollars. The principal domestic articles exported are flour, corn, rice, tobacco, cotton, beef, pork, cheese, butter, oil, whalebone, lumber, naval stores, &c. The foreign articles imported are piece goods, hardware, wines, spirits, teas, sugar, cocoa, &c. A canal 25 miles in length, connects the harbour of Boston with the river Merrimack. Agriculture is conducted with much skill. The principal productions are India corn, rye, oats, barley, potatoes, hemp, flax. Wheat is but little cultivated, being subject to blight.

Massachusetts, Massacre.

The inhabitants of this state are generally well educated, industrious, temperate, persevering, shrewd and resolute; but they are charged with hypocrisy, craft, obstinacy, a spirit parsimonious and selfish, and a temper severe and contentious. They are generally decent in their manners, and capital crimes are rare.

The legislative power resides in a senate and house of representatives. The senators and representatives are elected annually by all persons who have freehold estates of the annual value of three pounds, or any estate to the value of sixty pounds. The governor is also chosen annually. The judges hold their office during good behaviour. There is no state religion. The Congregationalists are the most numerous sect, the Baptists next. There are some Episcopalians, Methodists, and Quakers.

The district of MAINE, which extends along the Atlantic to the British colony of New Brunswick, is united with the state of Massachusetts. It covers an area of 32,628 square miles. It is similar in soil to Massachusetts, but rather more hilly and barren. It only contains about 1500 families. See UNITED STATES, SUPPLEMENT.

MASSACRE, a term used to signify the sudden and promiscuous butchery of a multitude. The most atrocious example of this kind upon record is that called the *Parisian* MASSACRE, or *Massacre of St Bartholomew's Day*. The Parisian massacre was carried on with such detestable perfidy, and executed with such a bloody cruelty as would surpass all belief, were it not attested by the most undeniable evidence. In the year 1572, in the reign of Charles IX. many of the principal Protestants were invited to Paris, under a solemn oath of safety, upon occasion of the marriage of the king of Navarre with the French king's sister; viz. the king of Navarre's mother, Coligni admiral of France, with other nobles. The queen-dowager of Navarre, a zealous Protestant, was poisoned by a pair of gloves before the marriage was solemnized; and on the 24th of August 1572, being Bartholomew's day, about daybreak, upon the toll of the bell of the church of St Germain, the butchery began. The admiral was basely murdered in his own house; and then thrown out of the window, to gratify the malice of the duke of Guise; his head was afterwards

Massacre. terwards cut off, and sent to the king and queen-mother; and his body, after a thousand indignities offered to it, hung up by the feet on a gibbet. After this, the murderers ravaged the whole city of Paris, and butchered in three days above ten thousand lords, gentlemen, presidents, and people of all ranks. An horrible scene of things, says Thuanus, when the very streets and passages resounded with the noise of those that met together for murder and plunder; the groans of those who were dying, and the shrieks of such as were just going to be butchered, were everywhere heard; the bodies of the slain thrown out of the windows; the courts and chambers of the houses filled with them; the dead bodies of others dragged through the streets, their blood running down the channels in such plenty, that torrents seemed to empty themselves in the neighbouring river; and in a word, an innumerable multitude of men, women with child, maidens, and children, were all involved in one common destruction; and the gates and entrances of the king's palace all besmeared with their blood.

From the city of Paris the massacre spread almost throughout the whole kingdom. In the city of Meaux they threw above two hundred into jail; and after they had ravished and killed a great number of women, and plundered the houses of the Protestants, they executed their fury on those they had imprisoned, and calling them out one by one, they were killed, as Thuanus expresses, like sheep in a market; the bodies of some were flung into ditches, and of others into the river Maine. In Orleans they murdered above five hundred men, women, and children, and enriched themselves with their spoil. The same cruelties were practised at Angers, Troyes, Bourges, La Charité, and especially at Lyons, where they inhumanly destroyed above eight hundred Protestants; children hanging on their parents necks; parents embracing their children; putting ropes about the necks of some, dragging them through the streets, and throwing them, mangled, torn, and half dead, into the river.

It would be endless to mention the butcheries committed at Valence, Romaine, Rouen, &c. We shall, therefore, only add, that, according to Thuanus, above thirty thousand Protestants were destroyed in this massacre, or as others with greater probability affirm, above one hundred thousand. Yet medals were struck at Paris in honour of it.

But how were the news of this butchery received at Rome, that faithful city, that holy mother of churches! How did the vicar of Christ, the successor of Peter, and the father of the Christian world, relish it? Let Thuanus tell the horrid truth. When the news, says he, came to Rome, it was wonderful to see how they exulted for joy. On the 6th of September, when the letters of the pope's legate were read in the assembly of the cardinals, by which he assured the pope that all was transacted by the express will and command of the king, it was immediately decreed that the pope should march with his cardinals to the church of St Mark, and in the most solemn manner give thanks to God for so great a blessing conferred on the see of Rome and the Christian world; and that on the Monday after, solemn mass should be celebrated in the church of Minerva; at which the pope, Greg. XIII. and cardinals were present; and that a jubilee should be published throughout the whole Christian world, and the cause of it declared to be, to return thanks to God for the extirpation of the enemies of the truth and church in France. In the evening the cannon of St Angelo were fired, to testify the public joy; the whole city illuminated with bonfires; and no one sign of rejoicing omitted that was usually made for the greatest victories obtained in favour of the Roman church. Massacre ‖ Massillon.

MASSAGETÆ, an ancient people about whose seat there is as much doubt as about that of the Amazons; Tibullus and Ammian place them near Albania, beyond the Araxes, which sometimes denotes the Oxus; it is probable they dwelt to the east of Sogdiana, (Dionysius Periegetes, Herodotus, Arrian).

MASSALIANS, a set of enthusiasts who sprang up about the year 361, in the reign of the emperor Constantius, who maintained that men have two souls, a celestial and a diabolical, and that the latter is driven out by prayer.

MASSANIELLO. See *History of* NAPLES.

MASSETER, in *Anatomy*. See there (*Table of the Muscles*).

MASSICOT. See MASTICOT.

MASSIEU, WILLIAM, a learned French writer, member of the Academy of Belles Lettres, and of the French Academy, was born at Caen in Normany in 1665, and completed his studies at Paris, when he entered amongst the Jesuits; but afterwards left them, that he might follow his inclination to polite literature with the greater freedom. In 1710 he was made Greek professor in the royal college; and enjoyed that post till his death, which happened at Paris in 1722. He wrote, 1. Several curious dissertations in the Memoirs of the Academy of Inscriptions. 2. A history of the French poetry, in 12mo, &c.

MASSILIA, in *Ancient Geography*, a town of Gallia Narbonensis, peopled by a colony of Phoceans, from Phocæa, a city of Ionia, universally celebrated, not only for its port, commerce, and strength, but especially for its politeness of manners and for its learning. Now *Marseilles*, a city of Provence.

MASSILLON, JEAN BAPTISTE, son of a notary at Hieres in Provence, was born in 1663, and entered into the congregration of the oratory in 1681. He gained the affections of every person in the towns to which he was sent, by the charms of his genius, the liveliness of his character, and by a fund of the most delicate and unaffected politeness. His first attempts in the art of eloquence were made at Vienne, while he was professor of theology. His funeral oration on Henry de Villars, archbishop of that city, received universal approbation. This success induced Father de la Tour, who was at that time general of the congregation, to call him to Paris. After he had been there for some time, he was asked what he thought of the preachers who made a figure on that great theatre?—"I find them possessed of great genius and abilities (answered he); but if I preach, I will not preach like them." He in fact kept his word, and struck out a new path in this great field of eloquence. P. Bourdaloue was excepted from the number of those whom he proposed not to imitate. If he did not take him for a model in every thing, the reason was, that his genius led him to a different species of eloquence.—

His

Massillon. His manner of composing, therefore, was peculiar to himself, and in the opinion of men of taste and judgement, was superior to that of Bourdaloue. The affecting and natural simplicity of the father of the oratory, (said a great man), appears fitter to bring home the truths of Christianity to the heart than all the dialectics of the Jesuit. We must seek for the logic of the gospel in our own breasts; and the most powerful reasonings on the indispensable duty of relieving the distressed, will make no impression on that man who has beheld without concern the sufferings of his brother. If logic is necessary, it is only in matters of opinion; and these are fitter for the press than for the pulpit, which ought not to be the theatre of learned discussions. The truth of these reflections was clearly perceived when he appeared at court. Upon preaching his first Advent sermon at Versailles, he received this eulogium from the mouth of Louis XIV. "Father, when I hear others preach, I am very well pleased with them; but whenever I hear you, I am dissatisfied with myself." The first time he preached his famous sermon *on the small number of the elect*, the whole audience were, at a certain place of it, seized with a sudden and violent emotion, and almost every person half rose from his seat by a kind of involuntary movement. The murmur of acclamation and surprise was so great that it threw the orator into confusion; but this only heightened the impression of that pathetic discourse. What was most surprising in Massillon, were his descriptions of the world, which were so sublime, so delicate, and so striking in the resemblance. When he was asked, whence a man, like him, whose life was dedicated to retirement, could borrow them; he answered "From the human heart; however little we examine it, we will find in it the seeds of every passion. When I compose a sermon (added he), I imagine myself consulted upon some doubtful piece of business. I give my whole application to determine the person who has recourse to me, to act the good and proper part. I exhort him, and urge him, and I leave him not till he has yielded to my persuasions." His declamation did not fail to be accompanied with success. "We think we see him in our pulpits (say those who had the pleasure of hearing him), with the simple air, the modest carriage, the downcast and humble looks, the easy gesture, the affecting tone, and the countenance of a man deeply penetrated with his subject, conveying the clearest information to the understanding, and raising the most tender emotions in the heart." Baron, the famous comedian, having met him one day in a house which was open for the reception of men of letters, paid him this compliment: "Continue to deliver as you do. Your manner is peculiar to yourself; leave the observance of rules to others." When this famous actor came from hearing one of his sermons, truth drew from him the following confession, which is so humiliating to his profession: "Friend (said he to one of his companions who accompanied him), here is an *orator;* we are only *actors*."

In 1704, Massillon made his second appearance at court, and displayed still more eloquence than before. Louis XIV. after expressing his satisfaction to him, added, in the most gracious tone of voice, *Et je veaux, mon pere, vous entendre tous les deux ans.* These flattering encomiums did not lessen his modesty. When Massillon. one of his fellows was congratulating him upon his preaching admirably, according to custom; Oh! give over, Father (replied he), the devil has told me so already, much more eloquently than you." The duties of his office did not prevent him from enjoying society; and in the country he forgot that he was a preacher, but always without trespassing against decency. One day when he was at the house of M. de Crozat, the latter said to him, "Father, your doctrine terrifies me, but I am encouraged by your life." He was chosen on account of his philosophical and conciliatory disposition of mind, to reconcile the cardinal de Noailles with the Jesuits. All he gained by his attempts was the displeasure of both parties; and he found that it was easier to convert sinners than to reconcile theologians. In 1717, the regent, personally acquainted with his merit, appointed him to the bishopric of Clermont. The next year, being destined to preach before Louis XV. who was only nine years of age, he composed in six weeks those discourses which are so well known by the name of *Petit Careme*. These are the chef d'œuvre of this orator, and indeed of the oratorical art. They ought continually to be read by preachers as models for the formation of their taste, and by princes as lessons of humanity.

Massillon was admitted into the French academy a year afterwards, in 1719. The abbacy of Savigny becoming vacant, the cardinal du Bois, to whom he had been weak enough to give an attestation for being a priest, procured it for him. The funeral oration of the duchess of Orleans, in 1723, was the last discourse he pronounced in Paris. He never afterwards left his diocese, where his gentleness, politeness, and kindness, had gained him the affection of all who knew him. He reduced the exorbitant rights of the episcopal roll to moderate sums. In two years, he caused 20,000 livres to be privately conveyed to the Hotel Dieu of Clermont. His peaceable disposition was never more displayed than while he was a bishop. He took great pleasure in collecting the fathers of the oratory and the Jesuits at his country house, and in making them join in some diversion. He died on the 28th of September 1742, at the age of 79. His name has become that of eloquence itself. Nobody ever knew better how to touch the passions. Preferring sentiment to every thing else, he communicated to the soul that lively and salutary emotion which excites in us the love of virtue. What pathetic eloquence did his discourses display! what knowledge of the human heart! what constant disclosing of a mind deeply affected with his subject! what strain of truth, philosophy and humanity! what imagination, at once the most lively, and guided by the soundest judgment! Just and delicate thoughts; splendid and lofty ideas; elegant, well chosen, sublime, and harmonious expressions; brilliant and natural images; true and lively colouring; a clear, neat, swelling and copious style, equally suited to the capacity of the multitude, and fitted to please the man of genius, the philosopher, and the courtier, form the character of Massillon's eloquence, especially in his *Petit Careme*. He could at once think, describe, and feel. It has been justly observed concerning him, that he was to Bourdaloue what Racine was to Corneille. To give the finishing

stroke

Massillon. stroke to his eulogium, Of all the French orators, he is the most esteemed by foreigners.

An excellent edition of Massillon's works was published by his nephew at Paris in 1745 and 1746, in 14 vols. large 12mo, and 12 vols. of a small size.—Among them we find, 1. Complete sets of Sermons for Advent and Lent. It is particularly in his moral discourses, such as are almost all those of his sermons for Advent and Lent, that Massillon's genius appears. He excels, says M. d'Alembert, in that species of eloquence, which alone may be preferred to all others, which goes directly to the heart, and which agitates without wounding the soul. He searches the inmost recesses of the heart, and lays open the secret workings of the passions, with so delicate and tender a hand, that we are hurried along rather than overcome. His diction, which is always easy, elegant, and pure, everywhere partakes of that noble simplicity, without which there can be neither good taste nor true eloquence; and this simplicity is, in Massillon, joined to the most attractive and the sweetest harmony, from which it likewise borrows new graces. In short, to complete the charm produced by this enchanting style, we perceive that these beauties are perfectly natural; that they flow easily from this source, and that they have occasioned no labour to the composer. There even occur sometimes in the expressions, in the turns, or in the affecting melody of his style, instances of negligence which may be called happy, because they completely remove every appearance of labour. By thus abandoning himself to the natural current of thought and expression, Massillon gained as many friends as hearers. He knew, that the more anxious an orator appears to raise admiration, he will find those who hear him the less disposed to bestow it. 2. Several Funeral Orations, Discourses, and Panegyrics, which had never been published. 3. Ten discourses, known by the name of *Petit Careme*. 4. The *Conferences Ecclesiastiques*, which he delivered in the seminary of St Magloire upon his arrival at Paris; those which he delivered to the curates of his diocese; and the discourses which he pronounced at the head of the synods which he assembled every year. 5. Paraphrases on several of the Psalms. The illustrious author of these excellent tracts wished that they had introduced into France a practice which prevails in England, of reading sermons instead of preaching them from memory; a custom which is very convenient, but by which all the warmth and fervour of eloquence are lost. He, as well as two others of his brethren, had stopt short in the pulpit exactly on the same day.—They were all to preach at different hours on Good-Friday, and they went to hear one another in succession. The memory of the first failed; which so terrified the other two, that they experienced the same fate. When our illustrious orator was asked, what was his best sermon? he answered, "That which I am most master of." The same reply is ascribed to Bourdaloue. The celebrated P. la Rue was of the opinion of Massillon, that getting by heart was a slavery which deprived the pulpit of a great many orators, and which was attended with many inconveniences to those who dedicated themselves to it. The abbé de la Porte has collected into one vol. 12mo, the most striking ideas, and the most sublime strokes, which occur in the works of the celebrated bishop of Clermont. This collection, Massillon || Masson. which is made with great judgment, appeared at Paris in 1748, 12mo, and forms the 15th volume of the large edition in 12mo, and the 13th of the small in 12mo. It is entitled, *Pensées sur differens sujets de morale et de pieté, tirées*, &c.

MASSINGER, Philip, an English dramatic poet, was born at Salisbury about the year 1581, and was educated at Oxford. He left the university without taking any degree; and went to London to improve his poetical genius by polite conversation. There he wrote many tragedies and comedies, which were received with vast applause, and were greatly admired for the ceonomy of the plots and the purity of the style. He was at the same time a person of the most consummate modesty; which rendered him extremely beloved by the poets of his time, particularly by Fletcher, Middleton, Rowley, Field, and Decker, who thought it an honour to write in conjunction with him. He was as remarkable for his abilities as his modesty. He died suddenly at his house on the Bank-side in Southwark, near the playhouse; and was interred in St Saviour's churchyard, in the same grave with Mr Fletcher the poet.

MASSIVE, among builders, an epithet given to whatever is too heavy and solid: thus a massive column is one too short and thick for the order whose capital it bears; and a massive wall is one whose openings or lights are too small in proportion.

MASSON, Papirius, a French writer, was the son of a rich merchant, and born in the territory of Forez, May 1544. After studying the belles lettres and philosophy, and travelling to different places, he came to Paris, where he was made librarian to the chancellor of the duke of Anjou, in which place he continued ten years. In 1576, he was made an advocate of parliament; yet never pleaded but one cause, which, however, he gained with universal applause.—When the troubles of France were at an end, he married the sister of a counsellor in parliament, with whom he lived thirty-four years, but had no issue by her.—The infirmities of age attacked him some time before his death, which happened Jan. 9. 1611. He wrote four books of French annals in Latin, first printed at Paris 1577, and afterwards in 1598, 4to. The second edition, more enlarged than the first, deduces things from Pharamond to Henry II. Masson considered this as his principal performance; yet he is now chiefly known by his *Elogia virorum clarissimorum*, although he published several other works.

Masson, *John*, a reformed minister in Holland some years ago. He was originally of France, but fled into England, to enjoy that liberty in religion which his country refused him. He wrote, 1. *Histoire critique de la republique des lettres*, from 1712 to 1717, in 15 vols 12mo. 2. *Vitæ Horatii, Ovidii, et Plinii junioris*, 3 vols small 8vo, and printed abroad, though dedicated to Englishmen of rank: the first at Leyden, 1708, to Lord Harvey; the second at Amsterdam, 1708, to Sir Justinian Isham; the third at Amsterdam, 1709, to the bishop of Worcester. These lives are drawn up in a chronological order, very learnedly and very critically; and serve to illustrate the history, not only of those particular persons, but of the times also in which they lived. 3. *Histoire de Pierre Bayle et des ses ouvrages*; Amsterdam, 1716, in 12mo. This

Masson, Massuah.

at least is supposed to be his, though at first it was given to M. la Monnoye.

MASSON, *Antony*, an eminent French engraver, who flourished towards the conclusion of the last century, and resided chiefly at Paris. It appears that he sometimes amused himself with painting portraits from the life, some of which he also engraved. We have no account of the life of this extraordinary artist; nor are we even informed from what master he learned the principles of engraving. He worked entirely with the graver, and handled that instrument with astonishing facility. He seems to have had no kind of rule to direct him with respect to the turning of the strokes; but twisted and twirled them about, without the least regard to the different forms he intended to express, making them entirely subservient to his own caprice. Yet the effect he has produced in this singular manner (Mr Strutt observes), is not only far superior to what one could have supposed, but is often very picturesque and beautiful. It was not in historical engraving that his greatest strength consisted. He could not draw the naked parts of the human figure so correctly as was necessary; but where the subject required the figures to be clothed, he succeeded in a wonderful manner. Among the most esteemed works by this admirable artist, may be reckoned the following: The assumption of the Virgin, a large upright plate from Rubens; a holy family, a middling-sized plate, lengthwise, from N. Mignard; Christ with the pilgrims at Emaus, a large plate, lengthwise, from Titian, the original picture of which is in the cabinet of the king of France. This admirable print is commonly known by the name of *the table cloth*: for the cloth, with which the table is covered, is executed in a very singular style. Also the following portraits, among others: The Comte de Harcourt, a large upright plate, reckoned a masterpiece in this class of subjects; Guillaume de Brisacier, secretary to the queen of France; a middling-sized upright plate: usually known in England by the name of *the Gray-headed Man*, because the hair in this print is so finely executed.

MASSUAH, a small island in the Red sea, near the coast of Abyssinia, about three quarters of a mile long, and half as broad, one-third of which is occupied by houses, another by cisterns for receiving rain-water, and one reserved for a burial place. It has an excellent harbour, with water sufficiently deep for ships of any size to the very edge of the island; and so well secured, that they may ride in safety, let the wind blow from what quarter or with what degree of strength it will. By the ancients it was called *Sebasticum Os*, and was formerly a place of great consequence on account of its harbour, from whence a very extensive commerce was carried on, and possessed a share of the Indian trade in common with other ports of the Red sea near the Indian ocean.—A very considerable quantity of valuable goods was also brought thither from the tract of mountainous country behind it, which in all ages has been accounted very unhospitable, and almost inaccessible to strangers. The principal articles of exportation were gold, ivory, elephants and buffaloes hides; but above all, slaves, who, on account of their personal qualifications, were more esteemed than those from any other quarter. Pearls of a considerable size, and of a fine water, are likewise found along the coast; from the abundance of all which valuable commodities, the great defect, a want of water, was forgot, and the inhabitants cheerfully submitted to such a great inconvenience. The island of Massuah fell under the power of the Turks in the time of the emperor Selim, soon after the conquest of Arabia Felix by Sinan Basha, and was for some time governed by an officer from Constantinople. From thence the conquest of Abyssinia was for some time attempted, but always without success. Hence it began to lose its value as a garrison for troops, as it had done in the commercial way after the discovery of the passage to India by the Cape of Good Hope.—Being thus deprived of its importance in every respect, the Turks no longer thought it worth while to send a bashaw thither as formerly, but conferred the government upon the chief of a tribe of Mahometans named *Belowie*, who inhabit the coasts of the Red sea under the mountains of Habab, in the latitude of about 14° north. On this officer they conferred the title of *Naybe*; and on the removal of the bashaw, he remained in fact master of the place, though, to save appearances, he pretended to hold it from the Ottoman Porte, by a firman from the Grand Signior for that purpose, and the payment of an annual tribute. Massuah.

The Turks had originally put into the town of Massuah a garrison of Janizaries; who, being left there on the withdrawing of the bashaw, and intermarrying with the natives, soon became entirely subjected to the naybe's influence. The latter finding himself at a great distance from his protectors the Turks, whose garrisons were everywhere falling into decay, and that in consequence of this he was entirely in the power of the emperor of Abyssinia, began to think of taking some method of securing himself on that side. Accordingly it was agreed that one half of the customs should be paid to the Abyssinian monarch; who in return was to allow him to enjoy his government unmolested. Having thus secured the friendship of the emperor of Abyssinia, the naybe began gradually to withdraw the tribute he had been accustomed to pay to the bashaw of Jidda, to whose government Massuah had been assigned; and at last to pay as little regard to the government of Abyssinia; and in this state of independence he was when Mr Bruce arrived there in 1769 on his way to Abyssinia. This gentleman found both the prince and his people extremely unhospitable and treacherous; so that he underwent a variety of dangers during his residence there, nor was it without great difficulty that he could get away from thence at last.

The island of Massuah, as we have said, is entirely destitute of water; nor can it be supplied with provisions of any kind but from the mountainous country of Abyssinia on the continent. It is consequently in the power of the emperor of that country, or of his officer the baharnagash, to starve Massuah and Arkeeko, by prohibiting the passage of any provisions from the Abyssinian side of the mountains.

The houses of Massuah are generally constructed of long poles and bent grass, as is usual with other towns of Arabia: only about 20 are of stone, and six or eight of these two stories high. The stones with which they are built have been drawn out of the sea; and

Massuah || Mast.

and in them the bed of that curious muscle found embodied in the solid rock at Mabon is frequently to be seen. These are called *dattoli da mare*, or sea dates: but our author never saw any of the fish themselves, though he has no doubt that they may be met with in the rocky islands of Massuah, if they would take the trouble of breaking the rocks for them. All the necessaries of life are very dear in this place; and their quality is also very indifferent, owing to the distance from whence they must be brought, and the danger of carrying them through the desert of Samhar, as well as to the extortions of the naybe himself, who, under the name of *customs*, takes whatever part of the goods he thinks proper; so the profit left to the merchant is sometimes little or nothing.

Though Massuah has now lost very much of its commercial importance, a considerable trade is still carried on from the place. From the Arabian side are imported blue cotton and other cloths; some of them from India being very fine. Other articles are Venetian beads, crystal, looking and drinking glasses, with cohol or crude antimony. These three last articles come in great quantity from Cairo, first in the coffee ships to Jidda, and then in small barks to the port of Massuah. Old copper is also a valuable article of commerce. The Galla and all the various tribes to the westward of Gondar wear bracelets of this metal, which in some parts of that barbarous country is said to sell for its weight of gold. Here is also a shell, an univalve of the species of volutes, which sells at a high price, and passes for money among the various tribes of Galla. The Banians were once the principal merchants of Massuah; but their number is now reduced to six, who are silversmiths, and subsist by making ornaments for the women on the continent. They likewise essay gold, but make a poor livelihood.

MASSUET, Rene, or Renatus, a very learned Benedictine of the congregation of St Maur, was born at S. Owen de Macelles, in 1665. He is chiefly known for the new edition of St Irenæus, which he published in 1710. He consulted several manuscripts, which had never been examined for that purpose, and made new notes and learned prefaces. He died in 1716, after having written and published several other works.

MAST, a long round piece of timber, elevated perpendicularly upon the keel of a ship, to which are attached the yards, the sails, and the rigging. A mast, with regard to its length, is either formed of one single piece, which is called a *pole-mast*, or composed of several pieces joined together, each of which retains the name of mast separately. The lowest of these is accordingly named the *lower mast*, *a* fig. 1.; the next in height is the top-mast, *b*, fig. 2. which is erected at the head of the former; and the highest is the top-gallant-mast, *c*, fig. 3. which is prolonged from the upper end of the top-mast. Thus the two last are no other than a continuation of the first upwards.

Plate CCCXV. Fig. 1, 2, 3.

The lower-mast is fixed in the ship by an apparatus described in the articles Hulk and Sheers: the foot, or heel of it rests in a block of timber called the *step*, which is fixed upon the *kelson*: and the top-mast is attached to the head of it by the *cap* and the *trestle-trees*. The latter of these are two strong bars of timber, supported by two prominences, which are as shoulders on the opposite sides of the mast, a little under its upper end: athwart these bars are fixed the *cross-trees*, upon which the frame of the top is supported. Between the lower mast head and the foremost of the cross-trees, a square space remains vacant, the sides of which are bounded by the two trestle-trees. Perpendicularly above this is the foremost hole in the cap, whose after hole is solidly fixed on the head of the lower-mast. The top-mast is erected by a tackle, whose effort is communicated from the head of the lower-mast to the foot of the top-mast; and the upper end of the latter is accordingly guided into and conveyed up through the holes between the trestle-trees and the cap, as above mentioned. The machinery by which it is elevated, or according to the sea phrase, *swayed up*, is fixed in the following manner: the top rope *d*, fig. 4. passing through a block *e*, which is hooked on one side of the cap, and afterwards through a hole, furnished with a sheave or pulley *f*, on the lower end of the top-mast, is again brought upwards on the other side of the mast, where it is at length fastened to an eye-bolt in the cap *g*, which is always on the side opposite to the top-block *c*. To the lower end of the top-rope is fixed the top-tackle *h*, the effort of which being transmitted to the top-rope *d*, and thence to the heel of the top-mast *f*, necessarily lifts the latter upwards, parallel to the lower-mast. When the top-mast is raised to its proper height, the lower end of it becomes firmly wedged in the square hole above described, between the trestle-trees. A bar of wood or iron called the *fid*, is then thrust through a hole *i* in the heel of it, across the trestle-trees, by which the whole weight of the top-mast is supported.

Mast

Fig. 4.

In the same manner as the top-mast is retained at the head of the lower-mast, the top-gallant-mast is erected, and fixed at the head of the top-mast.

Besides the parts already mentioned in the construction of masts, with respect to their length, the lower masts of the largest ships are composed of several pieces united into one body. As these are generally the most substantial parts of various trees, a mast, formed by this assemblage, is justly esteemed much stronger than one consisting of any single trunk, whose internal solidity may be very uncertain. The several pieces are formed and joined together, as represented in the section of a lower-mast of this sort, fig. 5. where *a* is the shaft, or principal piece into which the rest are fixed, with their sides or faces close to each other. The whole is secured by several strong hoops of iron, driven on the outside of the mast, where they remain at proper distances.

Fig. 5.

The principal articles to be considered in equipping a ship with masts are, 1st, the number; 2d, their situation in the vessel; and, 3d, their height above the water.

The masts being used to extend the sails by means of their yards, it is evident, that if their number were multiplied beyond what is necessary, the yards must be extremely short, that they may not entangle each other in working the ship, and by consequence their sails will be very narrow, and receive a small portion of wind. If, on the contrary, there is not a sufficient number of masts in the vessel, the yards will be too

large

MAST.

PLATE CCCXV.

Fig. 5.

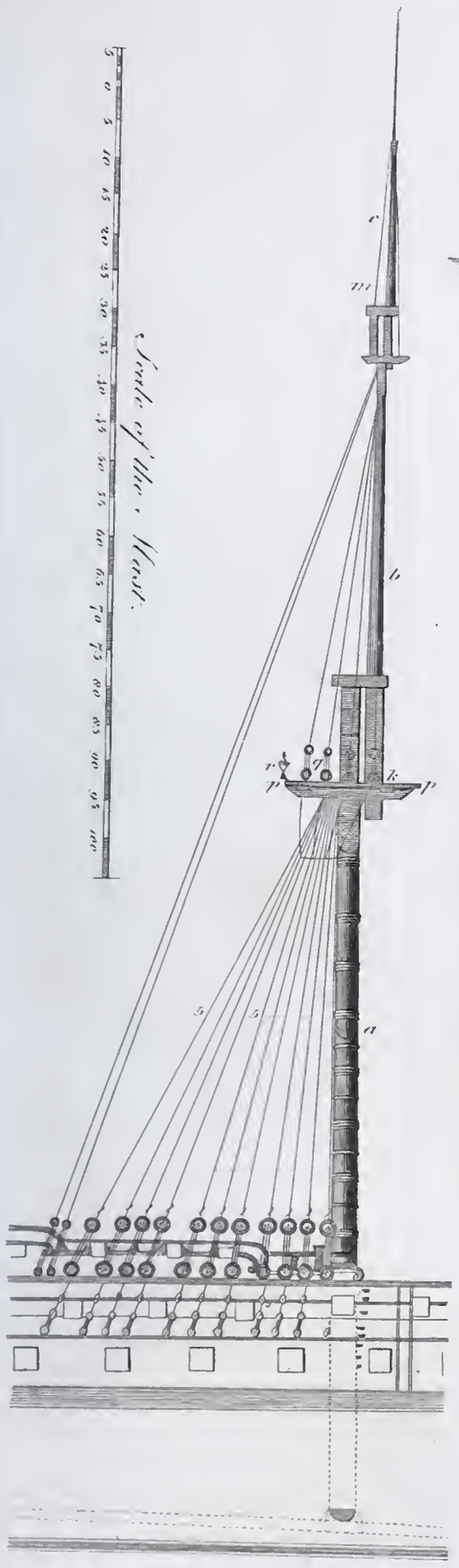


Fig. 6.

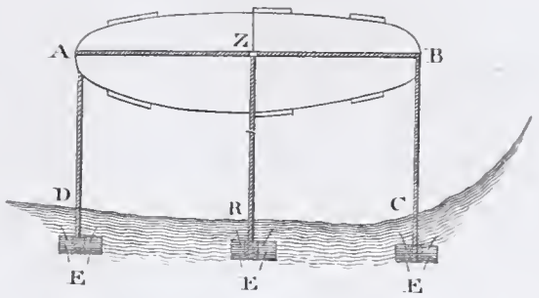


Fig. 3.

Fig. 2.

Fig. 4.

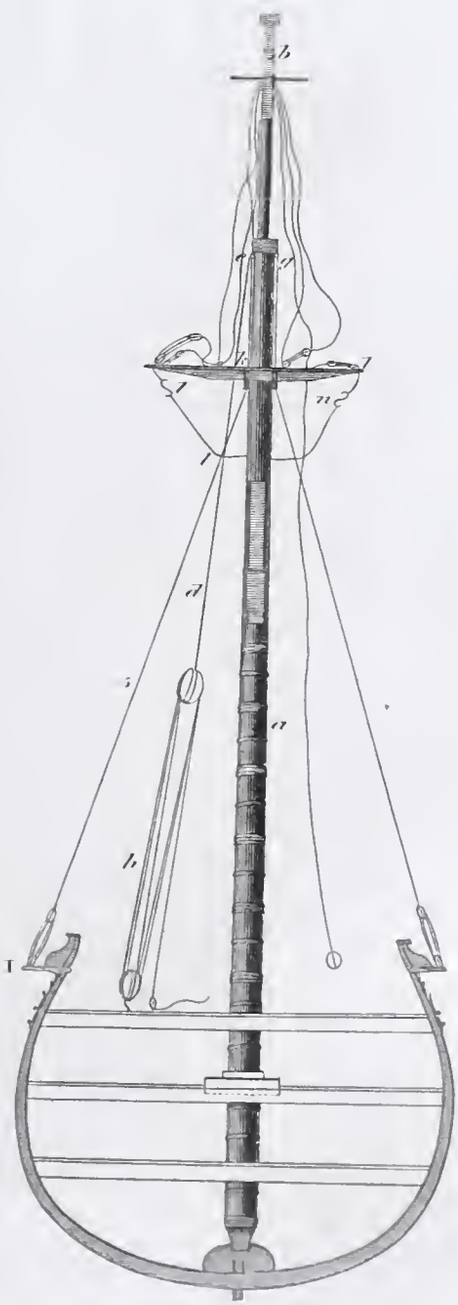
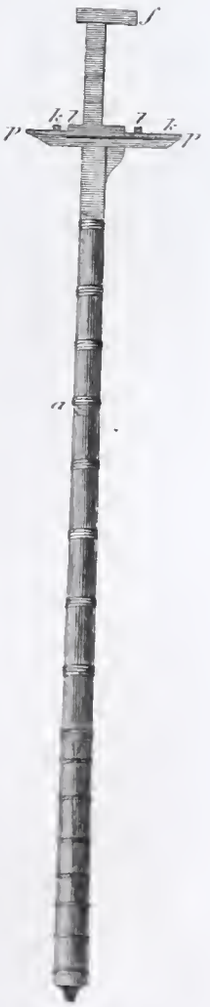


Fig. 1.



W. Archibald sculp.

Mast. large and heavy, so as not to be managed without difficulty. There is a mean between these extremes, which experience and the general practice of the sea have determined; by which it appears, that in large ships every advantage of sailing is retained by three masts and a bowsprit.

The most advantageous position of the masts is undoubtedly that from whence there results an equilibrium between the resistance of the water on the body of the ship on the one part, and of the direction of their effort on the other. By every other position this equilibrium is destroyed, and the greatest effort of the masts will operate to turn the ship horizontally about its direction; a circumstance which retards her velocity. It is counterbalanced indeed by the helm; but the same inconvenience still continues; for the force of the wind having the resistance of the helm to overcome, is not entirely employed to push the vessel forward. The axis of the resistance of the water should then be previously determined, to discover the place of the *main-mast*, in order to suspend the efforts of the water equally, and place the other masts so as that their particular direction will coincide with that of the main-mast. The wh of this would be capable of a solution, if the figure of the vessel were regular, because the point, about which the resistance of the water would be in equilibrio, might be discovered by calculation.

But when the real figure of the ship is considered, these flattering ideas will instantly vanish. This observation induced M. Saverien to employ a mechanical method to discover the axis of resistance of the water, which he apprehended might be used with success in the manner following:

When the vessel is launched, before the places of the Fig. 6. masts are determined, extend a rope AB, fig. 6. from the head to the stern. To the extremities A and B attach two other ropes, AD, BC, and apply to the other ends of these ropes two mechanical powers, to draw the ship according to the direction BC, parallel to itself. The whole being thus disposed, let a moveable tube Z, fixed upon the rope AB, have another rope ZR attached to it, whose other end communicates with a mechanical power R, equal to the two powers D and C. This last being applied to the same vessel, in such manner as to take off the effects of the two others by sliding upon the rope AB, so as to discover some point Z, by the parallelism of the ropes AD, BC feebly extended with the rope ZR; the line ZR will be the axis of the equilibrium of the water's resistance, and by consequence the main mast should be planted in the point Z.

The figures E, E, E, are three windlasses on the shore, by which this experiment is applied.

With regard to the situation of the other masts, it is necessary, in the same manner, to discover two points; so that the direction of the two mechanical powers operating, will be parallel to the axis of resistance RZ already found.

The exact height of the masts, in proportion to the form and size of the ship, remains yet a problem to be determined. The more the masts are elevated above the centre of gravity, the greater will be the surface of sail which they are enabled to present to the wind; so far an additional height seems to have been advantageous. But this advantage is diminished by the circular movement of the mast, which operates to make the vessel stoop to its effort; and this inclination is increased in proportion to the additional height of the mast, an inconvenience which it is necessary to guard against. Thus what is gained upon one hand is lost upon the other. To reconcile these differences, it is certain that the height of the mast ought to be determined by the inclination of the vessel, and that the point of her greatest inclination should be the term of this height above the centre of gravity. See the article TRIM. Mast. Master.

With regard to the general practice of determining the height of the masts, according to the different rates of the ships in the royal navy, the reader is referred to the article SAIL.

In order to secure the masts, and counterbalance the strain they receive from the effort of the sails impressed by the wind, and the agitation of the ship at sea, they are sustained by several strong ropes, extended from the upper ends to the outside of the vessel, called *shrouds*, marked 5, 5, 5, in fig. 4. and 5. They are further supported by other ropes, stretched from their heads towards the fore part of the vessel.

The mast, which is placed at the middle of the ship's length, is called the *main-mast;* that which is placed in the fore part, the *fore-mast;* and that which is towards the stern, is termed the *mizen-mast.*

N. B. *Mizen* is applied to this mast by all the nations of Europe, except the French, who alone call the fore-mast *misaine.*

MASTER, a title given to several officers and persons of authority and command; particularly to the chiefs of the orders of knighthood, &c.—Thus we say the grand master of Malta; of St Lazarus; of the Golden Fleece; of the Free Masons, &c.

MASTER (*Magister*), was a title frequent among the Romans: they had their master of the people, *magister populi*, who was the dictator. Master of the cavalry, *magister equitum*, who held the second post in an army after the dictator. Under the later emperors there were also masters of the infantry, *magistri peditum.* A master of the census, *magister census*, who had nothing of the charge of a censor, or subcensor, as the name seems to intimate; but was the same with the *præpositus frumentariorum.*

Master of the Militia (*magister militiæ*), was an officer in the lower empire, created, as it is said, by Diocletian, who had the inspection and government of all the forces, with power to punish, &c. somewhat like a constable of France. At first there were two of these officers instituted, the one for the infantry, and the other for the cavalry; but the two were united into one under Constantine. Afterwards, as their power was increased, so was their number also; and there was one appointed for the court, another for Thrace, another for the East, and another for Illyria. They were afterwards called *comites*, *counts*, and *clarissimi.* Their power was only a branch of that of the *præfectus prætorii*, who by that means became a civil officer.

Master of Arms (*magister armorum*), was an officer or comptroller under the master of the militia.

Master of the Offices (*magister officiorum*), had the superintendance of all the officers of the court; he was also called *magister officii palatini*, simply *magister;* and

Master. his post *magisteria*.—This officer was the same in the western empire with the curopalates in the eastern.

Master at Arms, among us, is an officer appointed to teach the officers and crew of a ship of war the exercise of small arms; to confine and plant centinels over the prisoners, and superintend whatever relates to them during their confinement. He is also to observe that the fire and lights are all extinguished as soon as the evening gun is fired, except those which are permitted by proper authority, or under the inspection of centinels. It is likewise his duty to attend the gangway when any boats arrive aboard, and search them carefully, together with their rowers, that no spirituous liquors may be conveyed into the ship unless by permission of the commanding officers. In these several duties he is assisted by proper attendants, called his *corporals*, who also relieve the centinels and one another at certain periods.

Master of Arts, the first degree taken up in foreign universities, but the second in ours; candidates not being admitted to it till they have studied in the university seven years.

Master-Attendant, is an officer in the royal dock-yards, appointed to hasten and assist at the fitting out or dismantling, removing, or securing vessels of war, &c. at the port where he resides. He is particularly to observe, that his majesty's ships are securely moored, and for this purpose he is expected frequently to review the moorings which are sunk in the harbour, and observe that they are kept in proper repair. It is also his duty to visit all the ships in ordinary, and see that they are frequently cleaned and kept in order; and to attend at the general musters in the dock-yards, taking care that all the officers, artificers, and labourers, registered in the navy-books, are present at their duty.

Master of the Ceremonies, is an officer instituted by King James I. for the more solemn and honourable reception of ambassadors, and strangers of quality, whom he introduces into the presence.—The badge of this office is a gold chain and medal, having on one side an emblem of peace, with King James's motto; and on the reverse the emblem of war, with *Dieu et mon droit*. He is always supposed to be a person of good address, and a master of languages, and has an appointment of 300l. a-year: he is constantly attending at court, and hath under him an assistant master, or deputy, at 6s. 8d. a-day, who holds his place during the king's pleasure.

There is also a third officer, called *marshal of the ceremonies*, with 100l. a-year, whose business is to receive and distribute the master's orders, or the deputy's, for the service; but without their order he can do nothing. This is the king's gift.

Masters of Chancery are usually chosen out of the barristers of the common law; and sit in chancery, or at the rolls, as assistants to the lord chancellor and the master of the rolls. All these, so late as the reign of Queen Elizabeth, were commonly doctors of the civil law.—To them are also committed interlocutory reports, examination of bills in chancery, stating of accounts, taxing costs, &c. and sometimes, by way of reference, they are empowered to make a final determination of causes.

They have, time out of mind, had the honour to sit in the house of lords, though they have neither writs nor patent to empower them; but they are received as Master. assistants to the lord chancellor and master of the rolls. They had anciently the care of inspecting all writs of summons, which is now performed by the clerk of the petty bag. When any message is sent from the lords to the commons, it is carried by the masters of chancery. Before them also affidavits are made, and deeds and recognizances acknowledged.

Besides these, who may be called *masters of chancery ordinary*, (being 12 in number, whereof the master of the rolls is reputed the chief), there are also masters of chancery extraordinary, appointed to act in the several counties of England beyond 10 miles distance from London, by taking affidavits, recognizances, &c. for the ease of the suitors of the court.

Master of the Faculties, an officer under the archbishop of Canterbury, who grants licenses and dispensations: he is mentioned in the statute 22 and 23 Car. II. See *Court of Faculties*.

Master Gunner. See Gunner.

Master of the Horse is reckoned the third great officer of the court, and is an office of great honour and antiquity, and always (when not put in commission), filled by noblemen of the highest rank and abilities. He has the management and disposal of all the king's stables and bred horses. He has authority over the equerries and pages, coachmen, footmen, grooms, riders of the great horse, farriers, and smiths. He appoints all the other tradesmen who work for the king's stables; and by his warrant to the avenor, makes them give an oath to be true and faithful. In short, he is intrusted with all the lands and revenues appropriated for the king's breed of horses, the expences of the stable, and of the coaches, litters, &c. He alone has the privilege of making use of any of the king's horses, pages, footmen, &c.; and at any solemn cavalcade he rides next the king, and leads a horse of state. His salary is 1276l. 13s. 4d. per annum. There is also a master of the horse in the establishment of her majesty's household, with a salary of 800l. a-year.

Master of the Household, is an officer under the treasurer of the household, in the king's gift: his business is to survey the accounts of the household.—He has 66l. 13s. 4d. a-year wages, and 433l. 6s. 6d. board wages.

Master of the Mint, was anciently the title of him who is now called *warden of the mint*; whose office is to receive the silver and bullion which comes to the mint to be coined, and to take care thereof. The office of master and worker is now distinct: and this officer is allowed for himself and three clerks 560l. a-year.

Master of the Ordnance. See Ordnance.

Master of the Revels, an officer with an appointment of 100l. a-year, whose business is to order all things relating to the performance of plays, masques, balls, &c. at court. Formerly he had also a jurisdiction of granting licenses to all who travel to act plays, puppet shows, or the like diversions; neither could any new play be acted at either of the two houses till it had passed his perusal and license; but these powers were afterwards much abridged, not to say annihilated, by a statute for regulating playhouses, till the licensing plays by the lord chamberlain was established.

Master. established. This officer has a yeoman with 46l. 11s. 8d. a-year.

Master of the Rolls, a patent officer for life; who has the custody of the rolls and patents which pass the great seal, and of the records of the chancery.

In the absence of the lord chancellor or keeper, he also sits as judge in the court of chancery; and is by Sir Edward Coke called his *assistant*.

At other times he hears causes in the rolls chapel, and makes orders and decrees. He is also the first of the masters of chancery, and has their assistance at the rolls: but all hearings before him are appealable to the lord chancellor.

He has also his writ of summons to parliament, and sits next to the lord chief justice of England on the second woolpack. He has the keeping of the parliament rolls, and has the rolls-house for his habitation; as also the custody of all charters, patents, commissions, deeds and recognisances, which being made of rolls of parchment gave rise to the name. Anciently he was called *clerk of the rolls*.

The authority of the master of the rolls to hear and determine causes, and his general power in the court of chancery, were the subject of divers questions and disputes which were very warmly agitated; to quiet which it was declared by stat. 3 Geo. II. cap. 30. that all orders and decrees by him made, except such as by the course of the court were appropriated to the great seal alone, should be deemed to be valid; subject nevertheless to be discharged or altered by the lord chancellor, and so as they shall not be enrolled till the same are signed by his lordship.

In his gift are the six clerks in chancery, the examiners, three clerks of the petty-bag, and the six clerks of the rolls chapel where the rolls are kept. See Rolls, Clerk, &c.

The master of the rolls is always of the privy council; and his office is of great profit, though much short of what it has been.

Master of a Ship, an officer to whom is committed the direction of a merchant vessel, who commands it in chief, and is charged with the merchandises on abroad.

In the Mediterranean the master is frequently called *patron*, and in long voyages *captain*.

It is the proprietor of the vessel that appoints the master; and it is the master who provides the equipage, hires the pilots, sailors, &c. The master is obliged to keep a register of the seamen and officers, the terms of their contract, the receipts and payments, and, in general, every thing relating to his commission.

Master of a Ship of War, is an officer appointed by the commissioners of the navy, to take charge of navigating a ship from port to port under the direction of the captain. The management and disposition of the sails, the working of a ship into her station in the order of battle, and the direction of her movements in the time of action, and in other circumstances of danger, are also more particularly under his inspection. It is likewise his duty to examine the provisions, and accordingly to admit none into the ship but such as are sound, sweet, and wholesome. He is moreover charged with the stowage; and for the performance of these services he is allowed several assistants who are properly termed *mates* and *quartermasters*. Master.

Master of the Temple. The founder of the order of the templars, and all his successors, were called *magni templi magistri;* and ever since the dissolution of the order, the spiritual guide and director of the house is called by that name. See Temple and Templar.

There were also several other officers under this denomination, as master of the wardrobe, with a salary of 2000l. a-year; master of the harriers, with 200l. a-year; master of the staghounds, with 800l. a-year; master of the jewel-office, &c. all now abolished.

Master and Servant; a relation founded in convenience, whereby a man is directed to call in the assistance of others, where his own skill and labour will not be sufficient to answer the cares incumbent upon him. For the several sorts of servants, and how that character is created or destroyed, see the article Servant. In the present article, we shall consider, first, the effect of this relation with regard to the parties themselves; and, secondly, its effects with regard to others.

1. The manner in which this relation affects either the master or servant. And, first, by hiring and service for a year, or apprenticeship under indentures, a person gains a settlement in that parish wherein he last served 40 days. In the next place, persons serving seven years as apprentices to any trade have an exclusive right to exercise that trade in any part of England. This law, with regard to the exclusive part of it, has by turns been looked upon as a hard law, or as a beneficial one, according to the prevailing humour of the times: which has occasioned a great variety of resolutions in the courts of law concerning it; and attempts have been frequently made for its repeal, though hitherto without success. At common law every man might use what trade he pleased; but this statute restrains that liberty to such as have served as apprentices: the adversaries to which provision say, that all restrictions (which tend to introduce monopolies) are pernicious to trade; the advocates for it allege, that unskilfulness in trades is equally detrimental to the public as monopolies. This reason indeed only extends to such trades, in the exercise whereof skill is required: but another of their arguments goes much farther; viz. that apprenticeships are useful to the commonwealth, by employing of youth, and learning them to be early industrious; but that no one would be induced to undergo a seven years servitude, if others, though equally skilful, were allowed the same advantages without having undergone the same discipline: and in this there seems to be much reason. However, the resolutions of the courts have in general rather confined than extended the restriction. No trades are held to be within the statute, but such as were in being at the making of it: for trading in a country village, apprenticeships are not requisite, and following the trade seven years is sufficient without any binding; for the statute only says, the person must serve *as* an apprentice, and does not require an actual apprenticeship to have existed.

A master may by law correct his apprentice for ne-

Master. gligence or other misbehaviour, so it be done with moderation: though, if the master or master's wife beats any other servant of full age, it is good cause of departure. But if any servant, workman, or labourer, assaults his master or dame, he shall suffer one year's imprisonment, and other open corporal punishment, not extending to life or limb.

By service all servants and labourers, except apprentices, become entitled to their wages; according to agreement, if menial servants; or according to the appointment of the sheriff or sessions, if labourers or servants in husbandry; for the statutes for regulation of wages extend to such servants only; it being impossible for any magistrate to be a judge of the employment of menial servants, or of course to assess their wages.

2. Let us now see how strangers may be affected by this relation of master and servant; or how a master may behave towards others on behalf of his servant, and what a servant may do on behalf of his master.

And, first, the master may *maintain*, that is, abet and assist, his servant in any action at law against a stranger: whereas, in general, it is an offence against public justice to encourage suits and animosities, by helping to bear the expence of them, and is called in law *maintenance*. A master also may bring an action against any man for beating or maiming his servant: but in such case he must assign, as a special reason for so doing, his own damage by the loss of his service; and this loss must be proved upon the trial. A master likewise may justify an assault in defence of his servant, and a servant in defence of his master: the master, because he has an interest in his servant, not to be deprived of his service; the servant, because it is part of his duty, for which he receives his wages, to stand by and defend his master. Also if any person do hire or retain my servant, being in my service, for which the servant departeth from me and goeth to serve the other, I may have an action for damages against both the new master and the servant, or either of them; but if the new master did not know that he is my servant, no action lies; unless he afterwards refuse to restore him upon information and demand. The reason and foundation upon which all this doctrine is built, seem to be the property that every man has in the service of his domestics; acquired by the contract of hiring, and purchased by giving them wages.

As for those things which a servant may do on behalf of his master, they seem all to proceed upon this principle, that the master is answerable for the act of his servant, if done by his command, either expressly given or implied: *nam qui facit per alium, facit per se.* Therefore, if the servant commit a trespass by the command or encouragement of his master, the master shall be guilty of it: not that the servant is excused, for he is only to obey his master in matters that are honest and lawful. If an innkeeper's servants rob his guests, the master is bound to restitution; for as there is a confidence reposed in him, that he will take care to provide honest servants, his negligence is a kind of implied consent to the robbery; *nam qui non prohibet, cum prohibere possit, jubet.* So likewise if the drawer at a tavern sells a man bad wine, whereby his health is injured, he may bring an action against the master; for although the master did not expressly order the servant to sell it to that person in particular, yet his permitting him to draw and sell it at all is implied a general command. Master.

In the same manner, whatever a servant is permitted to do in the usual course of his business, is equivalent to a general command. If I pay money to a banker's servant, the banker is answerable for it: If I pay it to a clergyman's or a physician's servant, whose usual business it is not to receive money for his master, and he embezzles it, I must pay it over again. If a steward lets a lease of a farm, without the owner's knowledge, the owner must stand to the bargain: for this is the steward's business. A wife, a friend, a relation, that use to transact business for a man, are *quoad hoc* his servants; and the principal must answer for their conduct: for the law implies, that they act under a general command; and without such a doctrine as this no mutual intercourse between man and man could subsist with any tolerable convenience. If I usually deal with a tradesman by myself, or constantly pay him ready money, I am not answerable for what my servant takes up upon trust; for here is no implied order to the tradesman to trust my servant: but if I usually send him upon trust, or sometimes on trust and sometimes with ready money, I am answerable for all he takes up; for the tradesman cannot possibly distinguish when he comes by my order and when upon his own authority.

If a servant, lastly, by his negligence does any damage to a stranger, the master shall answer for his neglect: if a smith's servant lames a horse while he is shoeing him, an action lies against the master, and not against the servant. But in these cases the damage must be done while he is actually employed in the master's service; otherwise the servant shall answer for his own misbehaviour. Upon this principle, by the common law, if a servant kept his master's fire negligently, so that his neighbour's house was burned down thereby, an action lay against the master; because this negligence happened in his service: otherwise, if the servant, going along the street with a torch, by negligence sets fire to a house; for there he is not in his master's immediate service, and must himself answer the damage personally. But now the common law is, in the former case, altered by statute 6 Ann. c. 3. which ordains, that no action shall be maintained against any in whose house or chamber any fire shall accidentally begin; for their own loss is sufficient punishment for their own or their servant's carelessness. But if such fire happens through negligence of any servant (whose loss is commonly very little), such servant shall forfeit 100l. to be distributed among the sufferers; and, in default of payment, shall be committed to some workhouse, and there kept to hard labour for 18 months. A master is, lastly, chargeable if any of his family layeth or casteth any thing out of his house into the street or common highway, to the damage of any individual, or the common nuisance of his majesty's liege people; for the master hath the superintendance of all his household. And this also agrees with the civil law; which holds, that the *pater familias*, in this and similar cases, *ob alterius culpam tenetur, sive servi, sive liberi.*

We may observe, that in all the cases here put, the master may be frequently a loser by the trust reposed

Master || Mastiff.

in his servant, but never can be a gainer: he may frequently be answerable for his servant's misbehaviour, but never can shelter himself from punishment by laying the blame on his agent. The reason of this is still uniform and the same; that the wrong done by the servant is looked upon in law as the wrong of the master himself; and it is a standing maxim, that no man shall be allowed to make any advantage of his own wrong.

Master Load, in mining, a term used to express the larger vein of a metal, in places where there are several veins in the same mountain. Thus it happens, that there are seven, sometimes five, but more usually three veins or loads, parallel to each other, in the same mountain. Of these the middle vein is the largest, and is called the *master load*.

Master Wort. See Imperatoria, Botany *Index*.

MATIFICATION, the action of chewing, or of agitating the solid parts of our food between the teeth, by the motion of the jaws, the tongue, and the lips, whereby it is broken into small pieces, impregnated with saliva, and so fitted for deglutition and a more easy digestion. See Anatomy, N° 104.

MASTICH, a kind of resin exuding from the lentiscus tree; and brought from Chio, in small yellowish transparent grains or tears of an agreeable smell, especially when heated or set on fire. See Pistachia.

This resin is recommended in old coughs, dysenteries, hemoptoës, weakness of the stomach, and in general in all debilities and laxity of the fibres. Geoffroy directs an aqueous decoction of it to be used for these purposes: but water extracts little or nothing from this resin. Rectified spirit almost entirely dissolves it, and the solution is very warm and pungent. Mastich is to be chosen in drops, clear, well-scented, and brittle.

We meet with a kind of cement sometimes kept in the shops under the name of mastich. It is composed of this gum, and several other ingredients, and is formed into cakes for use. This is intended for the service of lapidaries, to fill up cracks in stones, &c. but is by no means to be used for any medicinal purposes.

MASTICOT, Massicot, or Yellow Lead, is the calx or ashes of lead, gently calcined, by which it is changed to yellow of lighter or deeper tint, according to the degree of calcination. Masticot is sometimes used by painters, and it serves medicinally as a drier in the composition of ointments or plasters. The masticot which is used by the Dutch as the ground of their glazing, is prepared by calcining a mixture of one hundred weight of clean sand, forty-four pounds of soda and barilla, and thirty pounds of pearl ashes.

MASTIFF dog, Band Dog, (*canis villaticus*, or *catenarius*), is a species of great size and strength, and a very loud barker. Manwood says, that it derives its name from *mase thefese*, being supposed to frighten away robbers by its tremendous voice. Great Britain was formerly so noted for its mastiffs, that the Roman emperors appointed an officer in this island, with the title of *Procurator Cynegii*, whose sole business was to breed, and transmit from hence to the amphitheatre, such as would prove equal to the combats of the place. Strabo, lib. iv. tells us, that the mastiffs of Britain were trained for war, and used by the Gauls in their battles. See Canis, Mammalia *Index*.

Mastiff || Match.

MASTIGADOUR, or Slabbering-bit, in the manege, a snaffle of iron, all smooth, and of a piece, guarded with paternosters, and composed of three halfs of great rings, made into demi-ovals, of unequal bigness; the lesser being enclosed within the greater, which ought to be about half a foot high.

MASULAPATAN, a populous town of Asia in the East Indies, and on the coast of Coromandel, in the dominions of the Great Mogul. It carried on a great trade, and most nations in Europe had factories here; but the English have now left it, and even the Dutch themselves have not above a dozen people here to carry on the chintz trade. The inhabitants are Gentoos, who will not feed on any thing that has life; and they had a famous manufacture of chintz, which is greatly decayed since the English left off buying. The Great Mogul has a customhouse here; and the adjacent countries abound in corn, tobacco, and timber for building. It is seated on the west side of the bay of Bengal, 200 miles north of Fort St George. E. Long. 81. 25. N. Lat. 16. 30.

MATACA, or Mantaca, a commodious bay in America, on the north coast of the island of Cuba. Here the galleons usually come to take in fresh water in their return to Spain. It is 35 miles from the Havannah. W. Long. 85. 6. N. Lat. 25. 0.

MATAMAN, a country of Africa, bounded by Benguela on the north, by Monomotapa on the east, by Caffraria on the south, and by the Atlantic ocean on the west. There is no town in it, and the inhabitants live in miserable huts, it being a desert country, and but little visited by the Europeans.

MATAN, or Mactan, an island of Asia in the East Indian sea, and one of the Philippines. The inhabitants have thrown off the yoke of Spain; and it was here that Magellan was killed in April 1521.

Cape MATAPAN, the most southern promontory of the Morea, between the gulf of Coran and that of Colo-China.

MATARAM, a large town of Asia, formerly the capital of an empire of that name in the island of Java. It is strong by situation, and is seated in a very fertile, pleasant, and populous country, surrounded with mountains. E. Long. 111. 25. S. Lat. 7. 55.

MATARO, a town of Spain, in Catalonia; seated on the coast of the Mediterranean, 15 miles north-east of Barcelona, and 35 south-west of Gironne. It is a small town, but industrious and well-peopled; and the environs abound in vineyards, which produce wine much famed for its flavour. It likewise contains several manufactories, and is considered as one of the richest and most active towns in Catalonia. E. Long. 2. 35. N. Lat. 41. 30.

MATCH, a kind of rope slightly twisted, and prepared to retain fire for the uses of artillery, mines, fireworks, &c.

It is made of hempen tow, spun on the wheel like cord, but very slack; and is composed of three twists, which are afterwards again covered with tow, so that the twists do not appear: lastly, it is boiled in the lees of old wines. This, when once lighted at the end, burns on gradually and regularly, without ever going out

Match || Mate.

out till the whole be consumed: the hardest and driest match is generally the best.

Quick-Match. See *Quick-Match.*

MATCHING, in the wine trade, the preparing vessels to preserve wines and other liquors, without their growing sour or vapid. The method of doing it is as follows: Melt brimstone in an iron ladle, and when thoroughly melted, dip into it slips of coarse linen cloth; take these out, and let them cool; this the wine-coopers call a *match*. Take one of these matches, set one end of it on fire, and put it into the bung-hole of a cask; stop it loosely, and thus suffer the match to burn nearly out; then drive in the bung tight, and set the cask aside for an hour or two. At the end of this time examine the cask, and you will find that the sulphur has communicated a violent pungent and suffocating scent to the cask, with a considerable degree of acidity, which is the gas and acid spirit of the sulphur. The cask may after this be filled with a small wine which has scarce done its fermentation; and bunging it down tight, it will be kept good, and will soon clarify: this is a common and very useful method; for many poor wines could scarce be kept potable even a few months without it.

MATE *of a Ship of War*, an officer under the direction of the master, by whose choice he is generally appointed, to assist him in the several branches of his duty. Accordingly, he is to be particularly attentive to the navigation in his watch, &c. to keep the *log* regularly, and examine the line and glasses by which the ship's course is measured, and to adjust the sails to the wind in the fore part of the ship. He is to have a diligent attention to the cables, seeing that they are well *coiled* and kept clean when laid in the *tier*, and sufficiently *served* when employed to ride the ship. Finally, he is to superintend and assist at the stowage of the hold, taking especial care that all the ballast and provisions are properly stowed therein.

Mate || Materia.

Mate of a Merchant Ship, the officer who commands in the absence of the master thereof, and shares the duty with him at sea; being charged with every thing that regards the internal management of the ship, the directing her course, and the government of her crew.

The number of mates allowed to ships of war and merchantmen is always in proportion to the size of the vessel. Thus a first-rate man of war has six mates, and an East-Indiaman the same number; a frigate of 10 guns, and a small merchant ship, but only one mate in each; and the intermediate ships have a greater or smaller number, according to their several sizes, or to the services on which they are employed.

DURA *and* PIA MATER, the names given by anatomists to the two membranes which surround the brain. See ANATOMY, N° 129, 130.

MATERA, a considerable town of Italy, in the kingdom of Naples, and in the Terra d'Otranto, with a bishop's see, seated on the river Canapro. E. Long. 16. 43. N. Lat. 40. 51.

MATERIA MEDICA AND PHARMACY.

INTRODUCTION.

1 Definition of materia medica;

THAT department of medical science which treats of the nature, effects, and uses of those remedies that are employed for the prevention or removal of disease is called MATERIA MEDICA. It comprises the *natural history* of the articles, or an account of those circumstances by which they may be distinguished, and of the means of procuring and preserving them; their *chemical history*, or an account of the changes which they undergo from the action of various reagents, the mode of analyzing them, of separating their most useful principles, and of ascertaining their purity; and their *medical history*, or an account of their sensible effects on the animal system both in the healthy and morbid state, with their application to the practice of medicine.

2 and of pharmacy.

The art of collecting, and preserving the various substances employed in medicine, and of reducing them to those forms that are best suited to the various purposes for which they are exhibited, is called PHARMACY. This art is practised by the trading chemist and the apothecary; and at least the principles of it form a necessary part of education to every member of the medical profession.

In the present edition of our ENCYCLOPÆDIA, it is proposed to treat of these two subjects together, since they are intimately connected, and when considered under the same treatise, will occupy much less room.

3 Arrangement.

We shall divide this article into four parts; in the first of which we shall briefly treat of those articles that are employed to support life, or of diet; in the second we shall treat of remedies in general, and shall arrange them into classes according to their action on the animal economy; in the third we shall consider the methods of preparing them for exhibition, or shall lay down the general principles of pharmacy; and in the fourth we shall briefly notice each of the articles employed in medicine, whether simple or officinal, and mention the most important circumstances necessary to be known respecting them.

As the limits which have been assigned to this article are extremely confined, it cannot be expected that the subject will be treated at any great length. Contrary to usual practice, we shall dwell most on the general circumstances of materia medica and pharmacy, and shall be as brief on the individual articles as is consistent with perspicuity and practical utility.

4 Writers on the materia medica.

We shall not at present enter on a historical account of the writers on the materia medica and pharmacy. If we find room for such an account, we shall introduce it at the end of this article, where we conceive it would be most properly placed. It will be expected, however, that we should mention some of the most approved

Introduction.

proved works on these subjects, and this we shall here do very briefly.

5 Cullen's treatise.

As one of the principal modern writers on the materia medica, it will be sufficient to mention the *name* of Cullen. His work is still considered as classical, and is in the hands of every medical man. Whatever we may think of the reasoning and hypothesis which it contains, and however much we may be fatigued with the prolixity of some parts of the work, we shall always set a just value on the useful facts and practical remarks with which it abounds. It is to be regretted that Dr Cullen did not prepare a second edition of the materia medica before the infirmities of age had rendered him less qualified for the work, as in many respects the first edition is preferable to the second.

There are three works which Dr Cullen warmly recommended, and which he thought so excellent that he wished them to be in the hands of all his readers. These are Dr Lewis's "Experimental History of the Materia Medica," as published in 8vo by Dr Aikin; Bergius's "Materia Medica è regno Vegetabili;" and the "Apparatus Medicaminum" of Professor Murray of Gottingen.

6 Lewis's experimental history.

Soon after Dr Cullen published the second edition of his Materia Medica, a new edition of Lewis by Aikin appeared, superior to the former chiefly in containing the improvements made by the London college in their Pharmacopœia in 1788. Dr Lewis's work is still valuable for the facts which it contains relative to the natural history of the substances, and the action of several chemical agents on them; but from the late changes that have been made in chemical nomenclature, the language in which it is written has already become obsolete.

7 Murray's Apparatus Medicaminum.

Professor Murray had published but a small part of his "Apparatus Medicaminum," when the last edition of Cullen's Materia Medica appeared. He, however, lived to complete that part of his work which treats of vegetable substances, of which five volumes were published during his life, and a sixth after his death, by Dr Althof. In this last volume an account is given of columba root, angustura bark, myrrh, and several other medicines, which could not properly be introduced into the general arrangement, as the plants from which they are procured were not certainly known.

8 Gmelin's continuation.

A continuation of Murray's Apparatus Medicaminum in two volumes, containing an account of mineral substances, was published by Professor Gmelin in 1795. It is very good, but will scarcely now be consulted when the improved state of modern chemistry has given rise to the production of so many excellent works on the same subject.

9 Monro's Medical and Pharmaceutical Chemistry.

In 1788 Dr Donald Munro published a work on chemistry, pharmacy, and the materia medica, in three volumes 8vo, under the title of "Medical and Pharmaceutical Chemistry." At the time of its publication, it was the best work of the kind in our language; and it is still very valuable, though the late improvements in chemistry have in some measure diminished the utility of the chemical part of the work.

About ten years ago was published the first volume of a small work, entitled, A Practical Synopsis of the Materia Alimentaria and Materia Medica, by an anonymous author, who had also some time before published the *Thesaurus Medicaminum*. After an interval of ten years, this synopsis is at length completed by the publication of the second part of the second volume; and we consider it as one of the most useful works on the subjects on which it treats. Both it and the *Thesaurus* abound with excellent practical observations, but the arrangement adopted will in some respects be considered as antiquated. Of this more hereafter. As these two works are intimately connected, it is to be wished, that in a subsequent edition they should be united into one, in which form they would make two moderate 8vo volumes.

Introduction.

10 Practical Synopsis and Thesaurus Medicaminum.

11 Murray's Elements.

In 1804 Mr Murray, lecturer on chemistry and materia medica in Edinburgh, published his Elements of Materia Medica and Pharmacy, in two volumes, of which the second is chiefly a translation of the new edition of the Edinburgh Pharmacopœia, with some useful remarks. In his first volume, Mr Murray has made some ingenious observations on the general action of medicines, which, independently of the theory he adopts, we consider among the most valuable parts of his work.

12 Duncan's New Dispensatory.

Few works have had a more extensive circulation than the Edinburgh New Dispensatory, a work which was founded on the New Dispensatory of Dr Lewis published in 1753. Of this dispensatory several successive editions were published under the direction of Dr Webster, Dr Duncan, and Dr Rotheram, till in 1803 a new work, under the same title, was published by Dr Andrew Duncan, junior. Of this improved Dispensatory we need say little; the rapid sale of three large editions, and the call which has been made for a fourth, sufficiently evince the opinion which the public has formed of its utility and execution. It is perhaps the most complete guide to the practical apothecary which we have in any language.

13 Kirby's tables.

In 1805 was published a small volume containing a tabular view of the Materia Medica by Dr Kirby. This little work is intended as a manual to the young practitioner, and comprehends all the articles of the materia medica that are received into the Pharmacopœias of Edinburgh, London, and Dublin, arranged into classes; and the mode of prescribing them is illustrated by appropriate formulæ. Owing to the indifferent state of the author's health when this volume was printed, it is disfigured by numerous typographical errors; but these are in general only literal; and such as might mislead the practitioner are corrected in the table of *Errata*.

14 Late foreign works.

Among the best foreign publications on materia medica and pharmacy we may enumerate

Arnemann's Therapeia Generalis;
Mirabelli's Apparatus Medicaminum;
Bouillon Lagrange Manual de Pharmacien;
Swediaur's Materia Medica;
Swediaur's Pharmacopœia; and the foreign Pharmacopœias referred to in Duncan's Dispensatory.

PART

PART I. DIETETICS.

15 Dietetics.

THE subject of diet and regimen was much more attended to by the ancient physicians than it has been by those of modern times. In the writings of Hippocrates and Celsus we find some excellent remarks both on diet in general and on the particular diet that is suitable to sick people; and for many centuries these authors formed our only guides. Of late, indeed, this necessary branch of the healing art has been very successfully cultivated, and several valuable works have been published on the subject. Of these we shall here enumerate a few of the more respectable.

16 Writers on Diet.

Cullen's Materia Medica, vol. i.
Plenk's Bromatologia;
Synopsis of Materia Alimentaria and Materia Medica, vol. i.
Fordyce on Digestion;
Nisbet on Diet;
Halle's Articles on Diet in Encyclopédie Methodique; Dictionary of Medicine;
Beddoes's Hygeia;
Sir John Sinclair's Code of Health and Longevity.

In the brief sketch that we can here give of dietetics, we shall first treat of food in general, and then mention most of the animal and vegetable substances that have been or may be employed to support life.

17 Of food in general.

All food is either of an animal or vegetable origin. The former is, no doubt, more allied to our nature, and most easily assimilated to its nourishment; the latter, though digested with more difficulty, is the foundation of the former, as vegetables are the nourishment of animals, and all food is therefore properly derived from this source. In many respects, however, vegetable and animal food differ; and this difference it is proper to remark, according to the various effects it displays on different parts of the human system. In the choice of vegetable food, a much nicer selection is made by man than by any other animal; and his choice is chiefly confined to those of a *mild, bland nature*, and of an agreeable taste. When any other substances are selected, it is entirely for the purpose of condiment or medicine. The first difference to be observed between animal and vegetable food, is with respect to their effects on the stomach and bowels. In the stomach, vegetable food always displays a tendency to accescency, while animal food, on the contrary, tends towards putrefaction. Hence the former is apt to produce symptoms of uneasiness, while the latter in moderate quantity is almost never felt. In the same way, facility of solution belongs to vegetable food; while from greater firmness of texture, and viscidity, animal food is apt to oppress. Nor does the latter, from its oily texture, always mix easily in the stomach with other matters; while vegetables unite readily, but frequently continue long on the stomach for want of a proper stimulus. Similar effects are produced in the bowels by these different kinds of food, as well as in the stomach. The acescency of vegetable food is at all times apt to induce looseness; while the same effect is never known to arise from animal food, except in a very advanced state of putrefaction. On the contrary, the body is generally kept by it in a regular state; while vegetables, from the lesser portion of them going into chyle, produce a larger proportion of feculent matter, and lie longer in the bowels from their inactive nature before being expelled.

18

The nourishment conveyed by both kinds of food is much the same; but the animal product is in greater quantity, and more easily digested, while the vegetable retains its more watery nature, with a portion of unassimilating saline matter, which, though introduced, is again expelled by some of the excretions. The animal blood is then richer, more elaborated and stimulating, and excites a stronger action of the system than that produced from vegetables. Both products, however, equally take on an alkalescent nature in the circulation; for the acescency of the vegetable is confined entirely to its action on the stomach and bowels. Thus, from animal food a greater supply of nourishment is received for the wants of the system, depending on its greater quantity of oil, and its longer retention in the body than vegetable food. Agreeably to these different effects of animal and vegetable food, it is farther to be observed, that the latter is more quickly perspirable than the former. Hence the tendency to obesity, which arises from animal food; while part of the vegetable aliment is very quickly carried off by urine.

19

The combination of a vegetable and animal diet, is certainly best suited to preserve a proper state of health and strength. There are few who subsist entirely upon vegetables, and of these few, the constitutions are generally feeble, sickly, and weak, and they are the constant victims to complaints of the stomach and bowels. Where this method of life is at all practised, it is confined to hot climates, where vegetable diet may no doubt be carried to a greater extent without injury. Some nations also have gone to the other extreme, and live entirely on animal food; and in a very cold atmosphere, this may be indulged beyond what would otherwise be safe for the health of the body, so that a mixture of vegetable and animal nourishment seems best fitted for the health of man. But the proportion in which these ought to be used, is a point equally necessary to be inquired into. The benefits that attend animal food are clearly the giving a superior strength and vigour; but, in proportion as it carries this to excess, it exposes the body to dangerous consequences, and to the production of various diseases. Hence those who exceed in the animal, or what we may term the athletic diet, are soon worn out, and fall the victims of the over proportion of strength which such living bestows.

20

The advantages again of vegetable food, are mostly of the passive kind, and though it is difficult of assimilation, yet under certain circumstances, a tolerable degree of strength and vigour may be acquired from it. It is more favourable for the appetite than animal food, and little injury can arise from too much repletion with it. It has many advantages over animal food, as it introduces

Dieteties. troduces no improper acrimony into the system, and counteracts the baneful effects of animal diet. It is to this preference of vegetable food that the French owe their freedom from disease in a greater degree than the English: and the best rule to secure health, perhaps, is to confine infancy and youth mostly to a vegetable diet; manhood, and the decay of life, to animal food; while near the end of life, the vegetable system should again be returned to. But, whatever kind of diet we adopt, a variety in the form of our food, as well as the nature of it, should be attended to. Thus the constant use of solid nourishment, however wholesome and nutritious, by giving the stomach more to do than is necessary, must be attended with hurtful consequences. In the same way a perseverance in the liquid aliment, however fit by its qualities for conveying chyle into the system, could not fail to prove an improper diet, by depriving the stomach of that necessary stimulus from its form, which solid food conveys. A mixture, therefore, of solid and fluent nourishment is absolutely necessary, whatever the nature of that nourishment may be, and this proportion must be regulated by the different situations of different individuals. A man who is subjected to much bodily exertion, requires certainly the proportion of solid food to exceed, and likewise to be taken in the most permanent and nutritive state. A man again accustomed to little bodily labour, and subjected to the ease and inactivity of a sedentary life, should reverse this plan, and the proportion of liquid should be increased. In the use of the different kinds of food, the same regulations are proper. Where, along with a sedentary life, the stomach rejects much vegetable food, and a tendency to acidity renders its use improper, the bad consequences of an excess of animal diet must be corrected by giving it in the most soluble and diluted form. Thus the use of soups and broths becomes highly proper, as giving the sufficient stimulus of animal food to the stomach, and at the same time presenting it in a form by which a considerable part quickly passes off, and the excess of nourishment which constant animal food would produce is greatly counteracted. It is to this cause that we may attribute the little injury which animal food is known to produce in Scotland, and also in France, where soups are much used.

21 Proper quantity of food.

With respect to the quantity of food to be actually taken, this must be regulated much by the appetite and the supply required. The appetite is the great indication of health; and where the stomach is in a healthy state, it relishes almost every kind of nourishment that is presented. This being the case, we are entirely to be regulated in the quantity taken in by the appetite. Satiety is the natural consequence of repletion, and before this takes place, the stomach itself gives the alarm.

Among popular writers it has been a common axiom that a small quantity of food is most easily digested, and that we should rise from table with an appetite. This idea proceeds entirely from the opinion that digestion is effected by the muscular power of the stomach. But it is a truth sufficiently established that this is not the case. It depends entirely on the fluid of the stomach, or gastric secretion, and is performed by the application of this fluid equally well out of the body as within the organ. Indeed we may suppose that a considerable quantity of food, when taken, by producing a greater stimulus or irritation of the stomach, will increase the gastric fluid, and thus accelerate the process of digestion. At the same time it must be observed that there is in infancy a proper foundation for this restriction. The gastric fluid in children is more active, and their stomach yields more readily to distention; the appetite, therefore, will continue longer before the sense of satiety takes place: but even here, as the diet is mostly of a diluted kind, and soon passes off, we believe that more has been attributed to the effects of repletion, as the cause of disease in children, than what it deserves. Dieteties.

22 Body should be sufficiently nourished.

The proper rule, in all cases, is that the body should be sufficiently nourished, whatever the nature or the quantity of the nourishment employed may be, and this is best determined by the apparent state of the body, and what is again lost by it, or the quantity of its different discharges. The body also, we may observe, is at all times under the influence of habit, and where it is accustomed to be circumscribed, it is often amazing to find what small quantities of nourishment will suffice, and even health be preserved. Of this we have a number of remarkable instances brought forward by medical writers. Nor is this confined solely to man; the inferior animals show that their bodies can accommodate themselves to similar circumstances. This being the case, the constitution of man is limited in this respect less, even in civilized life, than what has been alleged. The chief point in health is to guard against extremities; for a uniform mode of life, even where errors are conspicuous, is always less dangerous than sudden excess, either of one kind or another.

23 Manner of taking food.

The manner of taking food also requires attention. In all solid nourishment a proper chewing should take place; this is a preparatory and necessary step to the action of the fluid in the stomach; but this chewing should not be carried, as some have advised, too far. Something should be left for the stomach to do, and this organ will be found improved by exercise and by increasing its active powers, as well as any other part of the body. Hence substances rather of difficult digestion may be at times properly presented to it.

In his choice of food man is not circumscribed like the other animals. Its respective salubrity or perniciousness he can in general judge of only by its taste. Hence, that his taste may be as little deceived as possible, most nourishing substances, we observe, are of a bland, mild nature, and contain nothing offensive to this organ. Hence too there is a certain pleasure conjoined with the gratification of appetite, which is meant both as an incentive to our taking nourishment, and also to direct us in the selection of it.

From the constitution, however, of man, experience shows that any nourishment, however unfit, may be assimilated by habit, and that wholesome and unwholesome are often merely relative terms, regulated by the existing circumstances in which individuals are placed.

The desire for solid food, is much seldomer carried to excess than that for fluids. Both, where they occur, are not the effect of a natural appetite, but rather of that artificial one which is created by the use of stimulants increasing the relish of food to the palate, or its stimulant effect on the stomach. This excess be-

Dietetics. comes increased by indulgence; and a habit, of course, comes to prevail, which distends the stomach, relaxes its tone, and destroys its elasticity; in consequence of which disorders of this organ arise, and a general fulness and corpulency in the whole system take place.

The manner of taking food, as well as the quantity and quality, requires some attention. All extremes in taking food should be carefully avoided; it should pass into the stomach in a slow and regular manner, blended by the process of chewing with a sufficient quantity of saliva to promote its dissolution in the stomach. If hurried over without attention to this, the difficulty of solution is increased, and the stomach is suddenly distended, and satiety produced before it is filled. The meal, therefore, becomes both deficient in quantity, and the food, from the digestive organs having more to do, remains longer on the stomach than is either necessary or proper*.

* See *Nisbet on Diet.*

For more on this subject, see the articles ALIMENT, FOOD, and DRINK, in this work, and the article DIETETICS, SUPPLEMENT.

After these general observations on diet, we shall take a brief survey of the principal articles employed as food, under the general heads of SOLID FOOD, DRINK, and CONDIMENTS.

A. SOLID FOOD.

I. *FROM THE ANIMAL KINGDOM.*

CLASS I. MAMMALIA. Order 1. PRIMATES.

24 Food derived from quadrupeds.

THERE are few animals of this order employed as food. In some countries, however, several species of the genus simia or *ape*, are eaten, particularly

25 Apes.

Simia inuus, *the Barbary ape.* S. Beelzebul, *the preacher monkey.* S. Paniscus, *the four-fingered monkey.*

26 Bats.

Some species of the bat tribe are occasionally eaten by the natives of warm climates, especially

Vespertilio vampyrus, *the vampyre bat.*

Order 2. BRUTA.

Several tribes of this order afford nourishment to uncivilized nations.

27 Ant-eater.

The great ant-eater (*myrmecophaga jubata*) is frequently eaten by the American Indians; but its flesh has a strong and disagreeable flavour.

28 Armadillo.

Most species of dasypus or *armadillo* form an article of diet among the Indians.

29 Rhinoceros.

The flesh of the rhinoceros bicornis, or *two-horned rhinoceros*, is eaten in Abyssinia; but its flesh is very sinewy.

30 Elephant.

The flesh of the elephant is often eaten, both by the Abyssinians and Hottentots. See ELEPHANT, MAMMALIA *Index.*

31 Walrus.

Several species of trichecus, or *walrus*, are eatable, especially

Trichecus rosmarus, or *arctic walrus.*

Order 3. FERÆ.

From this order mankind have long derived part of their nourishment, especially in the earlier periods of society.

32 Seal.

The flesh of the common seal (*phoca vitulina*) was, a few centuries ago, served up at the tables of the great in this country; and it still forms the principal subsistence of the Greenlanders, Icelanders, and Kamtschadales. Dietetics.

33 Bear.

The brown or black bear (*ursus arctos*) is eaten by the common people in Norway, Russia, and Poland. It is difficult of digestion, and is generally salted and dried before being used.

34 Dog.

Of the dog tribe few species have been employed for the food of man, though the common dog is greedily eaten by the inhabitants of the South-sea islands, and is sometimes used as food in more civilized societies. See DOG, MAMMALIA *Index.*

35 Lion.

Of the cat tribe, the flesh of the lion is considered as excellent food by several nations of Africa, and Kolben prefers it to most other animal food.

36 Otter.

The common otter (*lutra vulgaris*) is eaten in several Roman Catholic countries, and considered as nearly allied to fish. See OTTER, MAMMALIA *Index.*

The young of the sea otter (*lutra marina*) are said to be delicate eating, not easily to be distinguished from lamb.

37 Opossum.

Several species of *didelphis* or opossum are considered by the natives of South America as equally good food with the flesh of the hare or rabbit, especially

Didelphis Virginiana, *the Virginian opossum.*

38 Kanguroo.

The kanguroo (*macropus major*) forms a chief part of the animal food used by the natives of New Holland; but the flesh is very coarse.

39 Hedgehog.

The common hedgehog (*erinaceus europæus*) is occasionally used as food; and its flesh is said to be extremely delicate.

Order 4. GLIRES.

40 Porcupine.

The common porcupine (*hystrix cristata*) is eaten in Sicily and Malta, and is frequently introduced to the politest tables at the Cape of Good Hope.

41 Cavia.

Several species of *cavia* are used as food in Guiana, Brazil, and other parts of South America, especially

Cavia cobaya, *the Guinea pig.* C. paca, *the spotted cavy.* C. aguti, *the long-nosed cavy*, and C. aperea, *the rock cavy.*

42 Beaver.

The flesh of the beaver (*castor fiber*) is employed as food in America, and is said to be good eating. It is preserved by drying it in the smoke.

43 Marmot.

The alpine marmot (*arctomys marmota*) affords nourishment to the poorer inhabitants of the Tyrol, Savoy, and other parts of the Alps; and, besides this, three other species are eatable, viz.

Arctomys monax, *the Maryland marmot.* A bobac, *bobak;* and A. citellus, *the casan* or *carless marmot.*

44 Squirrel.

Several species of sciurus, or *squirrel*, may be eaten, especially the common squirrel (*sciurus vulgaris*), which is much used in Sweden and Norway, and its flesh is said to resemble that of a barn-door fowl.

45 Jerboa.

The common jerboa (*dipus jaculus*) is eaten by the Arabs, who esteem its flesh among their greatest delicacies.

46 Hare and rabbit.

Most species of lepus, or the *hare* tribe, are used as common food, especially

Lepus timidus, *the common hare*, and L. cuniculus, *the rabbit.*

Of these the flesh of the rabbit is softer and more digestible than that of the hare; but it is not so nourishing.

Dietetics. ing. Wild rabbits are both more digestible and more palatable than such as are domesticated.

Order 5. Pecora.

It is from this order that the principal part of animal food, in civilized countries, is derived. Almost all the animals contained in this order form excellent food.

47 Camelus. Some species of *camelus*, or the camel tribe, are eaten, especially

Camelus dromedarius, *the Arabian camel.* C. glama, *the glama*, whose flesh is said to resemble mutton.

Of the genus *cervus*, the following species are most used, viz.

48 Elk. Cervus alces, *the elk*, eaten in Norway, Lapland, and Sweden, where its flesh is much esteemed. It is very nourishing, but lies long on the stomach.

49 Stag. C. elaphus, *the common stag.* The flesh of this animal, when full grown, is well known under the name of *venison*, and is very digestible, wholesome, and nourishing. The animal should not be killed till he is above four years old, and the flesh is fattest and best flavoured in the month of August.

50 Rein deer. C. tarandus, *the rein deer.* The flesh of this species forms the principal nourishment of the Laplanders; the tongues are excellent when salted and smoked, and the milk is sweet and nourishing.

51 Fallow deer. C. dama, *the fallow-deer.* The flesh of this species is a variety of venison, and nearly resembles that of the stag. The buck is preferred.

52 Roebuck. C. capreolus, *the roebuck.* The flesh of the roebuck is considered as inferior to that of the last species.

Of the genus antilope, almost all the species afford excellent food; but the following is most generally employed, viz.

53 Chamois. Antilope rupicapra, *the chamois.*

The flesh of the young ibex (*capra ibex*) is said to be excellent food.

54 Goat. Of the common goat (*capra hircus*) only the young are employed as food; and a roasted kid is a very common dish in America and the West Indies. Of goat's milk we shall speak hereafter.

55 Sheep. Ovis aries, *the common sheep.* Mutton is well known to be a highly nutritious and wholesome meat. It is perhaps more universally used than any other animal food. *Tup-mutton* has such a strong smell and disagreeable taste, and is, besides, so exceedingly tough and difficult of digestion, that it is never eaten but by those who cannot afford to purchase mutton of a better quality. *Ewe mutton*, if it be more than between two and three years old, is likewise tough and coarse. *Wedder-mutton*, or the flesh of the castrated animal, is most esteemed, and is by far the sweetest and most digestible. *Lamb* being less heating and less dense, is better suited to weak stomachs; but this applies only to the flesh of lambs that have not been robbed of their blood by repeated bleedings, or reared by the hand with milk adulterated with chalk, in order to make the meat appear white. Such practices to render the food pleasing to the eye, at the expence of its alimentary properties, cannot be too much reprobated.

56 Ox. Bos taurus, *the common bull and cow.* The flesh of the bull has a strong disagreeable smell, and is dry, tough, and difficult of solution in the stomach. Bull-beef is rarely eaten. But the flesh of the ox, or castrated animal, called *ox-beef*, is a highly nourishing and wholesome food, readily digested by healthy persons, and constituting a principal part of the common diet of the inhabitants of this and many other countries. It is the most strengthening of all kinds of animal food. Cow-beef is not so tender nor so nourishing, nor so digestible as ox-beef. Veal is tender and nourishing; but not so easily digested, nor so well suited to weak stomachs, as is commonly imagined. It is matter of just complaint, that the same injurious methods are practised in the rearing and management of calves, as have been already noticed under the article Lamb. By such treatment the quality of the flesh is much depraved. What is called *beef-tea*, is prepared by putting a pound of the lean part of beef, cut into very thin slices into a quart of water, and boiling it over a quick fire about five minutes, taking off the scum. The liquor is afterwards poured off clear for use. This makes a light and pleasant article of diet for weak and delicate people. On some occasions spices may be advantageously added to it. Gravy soup is very nourishing, but is heavy and heating. It is used as a clyster, as well as taken into the stomach. Calves-feet jelly is highly nutritious and demulcent. Dietetics.

Besides the common ox, the following species are employed as food, viz.

Bos americanus, *the American bison.* B. moschatus, *the musk bull.* B. bubalus, *the buffalo.* B. caffer, *the cape ox*, and B. grunniens, *the yak.*

Order 6. Belluæ.

57 Horse. The flesh of the horse may be eaten, but is very coarse. Mare's milk is often used medicinally, but is considered as inferior to that of the ass.

58 Asses milk. Asses milk is light, and well suited to weak stomachs. It is commonly employed in consumptive cases; and Hoffman recommends it in gout, rheumatism, jaundice, debility of the bowels, disorders of the urinary passages, and in fluor albus.

59 Tapir. The flesh of the tapir (*taper americanus*) is much esteemed by the inhabitants of South America, but is inferior to our beef.

60 Hog. The flesh of the wild boar is dense, but sufficiently tender, very nourishing, and more savoury than that of the domestic hog. But as the general properties of both are the same, they will be here noticed together. The flesh of the wild boar is in season in the month of October. The head is esteemed the finest part. The flesh of the young animal is reckoned a great delicacy. *The common or domestic boar. The sow.* The flesh of the sow is strong, and makes bad bacon. It is the flesh of the castrated animal that is in common use, and that is known by the name of *pork.* On account of the fat or lard with which it abounds, it is not very easily digested. It is a very savoury food, and affords a strong nourishment, suited to persons who lead an active or laborious life. The too frequent and long continued use of this meat favours obesity, produces foulness of the stomach and bowels, and occasions disorders of the skin. The flesh of the *sucking pig* is reckoned a great delicacy, is very nourishing; but by reason of the thick and slimy juice with which it abounds, it is not very readily dissolved in the stomach, and therefore is by no means a proper food for weak and sickly persons. Bacon is a coarse and heavy, but

Dietetics. nutritive food, only fit to be taken in considerable quantity by robust and labouring people. When it constitutes a principal part of the daily diet, it brings on disorders similar to those which arise from the immoderate use of pork. In consequence of the fat or lard with which it abounds, the flesh of the swine tribe is more or less laxative. Upon the whole, it may be said of pork, that the occasional and sparing use of it is sufficiently salutary; but that it cannot be made a principal part of the daily diet, without producing disorder in many constitutions, and particularly in those who are of a melancholic temperament, and lead a sedentary life.

The flesh of the different species of this genus is edible, especially that of the *sus tajassu* and *S. babyrussa*.

61 Food from birds.

Class II. BIRDS. Order 2. Picæ.

62 Picæ.

Of this order only two species are generally used as food.

Corvus frugilegus, *the rook*. The young of this bird is very similar to the pigeon, but is rather inferior in flavour and digestibility.

P. viridis, *the green woodpecker*. The flesh of this and some other species is palatable, but of difficult solution.

63 Anseres.

Order 3. Anseres.

Of this order the principal species that are eaten belong to the genus *anas*, of which all the species may be used for food; but the following are most generally employed, viz. anas cygnus, *the wild swan*. A. olor, *the tame swan*. A. anser, *the goose*. A. bernicla, *the brent goose*. A. moschata, *the Muscovy duck*. A. penelope, *wigeon*. A. ferina, *pochard*. A. crecca, *teal*. A. boschas, *wild duck*. A. domestica, *the tame* or *common duck*.

Alca arctica, *puffin*. A. tarda, *the razor-bill*. A. cirrhata, *the tufted auk*.

Pelicanus bassanus, *the soland goose*.

Larus marinus, *the black-backed gull*.

Of these the swan, the goose, the wigeon, the teal, the wild and tame duck, are the most digestible; the barnacle, the puffin, the soland goose, and the black-backed gull, are very fat, heavy, and have generally a fishy taste.

64 Grallæ.

Order 4. Grallæ.

Of this order most of the genera furnish very good and savoury food. The following are most commonly used, viz.

Scolopax rusticola, *the woodcock*. S. gallinago, *the snipe*. S. gallinula, *the jack snipe*. S. glottis, *the greet plover*, or *green-shank*. S. tetanus, *the spotted snipe*. S. limosa, *the stone plover*. S. lapponica, *the red godwit*.

Tringa pugnax, *the ruff* and *reeve*. T. vanellus, *the lapwing* or *bastard plover*. T. cinclus, *the purre*. T. squatarrha, *the gray plover*, or *sandpiper*.

Charadrius marinellus, *the dotterel*. C. pluvialis, *the green plover*. C. œdicnemus, *the thick-kneed bustard*. C. hemantopus, *the long-legged plover*.

Fulica fusca, *the brown gallinule*. F. chloropus, *the common water-hen*. F. porphyrio, *the purple water-hen*.

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65 Gallinæ.

Order 5. Gallinæ.

This order furnishes the principal part of the food which we derive from the class of birds. The following species afford excellent nourishment, viz.

Pavo cristatus, *the peacock*.

Meleagris gallipavo, *the turkey*.

Penelope cristata, *the guhan*.

Crax alector, *the crested curassow*.

Phasianus gallus, *the common fowl*. Ph. colchicus, *common pheasant*.

Numida meleagris, *the Guinea hen*.

Tetrao urogallus, *the wood grouse*. T. tetrix, *the black cock*, or *black game*. T. lagopus, *red game*. T. perdix, *the common partridge*. T. coturnix, *the quail*.

66 Passeres.

Order 6. Passeres.

The following species of this order may be employed as food, viz.

Columba domestica, *the common pigeon*, and C. palumbus, *the ring dove*.

Alauda, *the lark*. All the species.

Turdus viscivorus, *the missel thrush*. T. pilaris, *the fieldfare*. T. merula, *the blackbird*.

Loxia curvirostra, *the sheldapple* or *crossbill*. L. coccothraustes, *the grosbeak* or *hawfinch*. L. chloris, *the green finch*.

Emberiza nivalis *the snow bunting*. E. miliaria, *the bunting*. E. hortulana. E. citrinella, or *yellow hammer*.

Fringilla celebs, *the chaffinch*. F. montifringilla, *the brambling*, or *bramble-finch*. F. domestica, *the house sparrow*. F. montana, *the tree sparrow*.

Motacilla modularis, *the hedge sparrow*. M. ficedula, *the epicurean warbler*. M. œnanthe, *the wheat-ear*. M. rubitra, *the whin-chat*. M. rubicula, *the stonechatter*. M. phœnicurus, *the redstart*. M. erithalus, *the redtail*.

Hirundo esculenta, *the esculent swallow*.

After this enumeration of birds, we must say something respecting the nutritious properties of *eggs*.

67 Eggs.

It is probable that the eggs of all the birds which we have mentioned, and perhaps of most others, might be employed as food; but custom and convenience have given the preference to those of the common hen, the guinea hen, and the duck. The fluid contents of an egg consist of the white and the yolk. The former very much resembles the lymph of the blood, or the coagulable part of milk. The latter, viz. the yolk, is an animal mucilage, composed of oil, coagulable lymph and water. It is miscible with cold water, so as to form an emulsion. The oil is separable from the yolk, boiled till it becomes hard, by means of pressure *.

The eggs of all granivorous birds, and especially of the domestic fowl, yield a mild demulcent and strengthening aliment, well suited to consumptive persons, and such as are exhausted by immoderate evacuations. Raw eggs are gently laxative, and are found to be serviceable in cases of jaundice and obstructed liver. A nutritive restorative drink is prepared by rubbing the yolks of two or three eggs, and a little white sugar, with a pint

* See *Chemistry*.

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Both the white and yolk of eggs are very indigestible when boiled to hardness. Eggs should be subjected to as little of the art of cookery as possible. The lightest as well as the simplest mode of preparing them for the table, is to boil them only as long as is necessary to coagulate slightly the greatest part of the white, without depriving the yolk of its fluidity. This is what is called poaching them; and in this way they sit well upon most stomachs.

68 Food from reptiles.

Class III. AMPHIBIA. Order 1. Reptiles.

This class furnishes but few articles of food, and of these the following are the most usually employed, viz.

Testudo mydas, *the green turtle*, T. ferox. T. græca, *the land turtle.*

Rana esculenta, *the edible frog*, or *green water-frog.*

Lacerta agilis, *common green lizard.* L. scincus, *the scink.*

69 From serpents.

Order 2. Serpents.

Coluber viper, *the viper.* C. perus, *the adder.*

Of these the turtle is well known as a most nourishing and palatable food. The esculent frog, though not very nutritious, tastes much like chicken; the viper and adder are chiefly used in soups, which are considered as great restoratives.

70 Food from fishes.

Class IV. FISHES.

It is probable that almost all the different species of fish might be employed as food, but the following are chiefly eaten, viz.

71 Apodes.

Order 1. Apodes.

Muræna anguilla, *the common eel.* M. conger, *the conger eel.* Ammodytes tobianus, *the sand launce*, or *sand eel.*

72 Jugulares.

Order 2. Jugulares.

Callyonimus lyra, *the gemmous dragonet.* C. dracunculus, *the sordid dragonet.*

Trachinus draco, *the weaver.*

Gadus æglefinus, *the haddock.* G. catlarias, *the torsk*, G. morrhua, *the cod-fish.* G. barbatus, *the pont.* G. merlangus, *the whiting.* G. pollachius, *the pollack.* G. molva, *the ling.* G. lota, *the barbot.*

73 Thoracici.

Order 3. Thoracici.

Zeus faber, *the dory.*

Pleuronectes hippoglossus, *the holibut.* P. platessa, *the plaise.* P. flesus, *the flounder.* P. limanda, *the dab.* P. solea, *the sole.* P. maximus, *the turbot.*

Chætodon rostratus, *the jaculator.* C. imperator, *the emperor of Japan.*

Sparus mæna,

Perca fluviatilis, *the perch.*

Scomber, *the mackerel.*

Mullus barbatus, *the red surmullet.* M. surmuletus, *the striped surmullet.* Dietetics.

Trigla lyra, *the piper.*

74 Abdominales.

Order 4. Abdominales.

Cobitis barbetula, *the loach*, or *groundling.*

Salmo salar, *the salmon.* S. trutta, *the sea trout.* S. fario, *the trout.* S. alpinus, *the charr.* S. salvelinus, *the salmon trout.* S. umbla. S. eperlanus, *the smelt.* S. albula, *the whiting.* S. thymallus, *the grayling.*

Esox lucius, *the pike.*

Mugil cephalus, *the mullet.*

Clupea harengus, *the herring.* C. sprattus, *the sprat.* C. alosa, *the shad.* C. encrasicolus, *the anchovy.*

Cyprinus barbus, *the barbel.* C. carpio, *the carp.* C. gobio, *the gudgeon.* C. tinca, *the tench.* C. cephalus, *the chub.* C. leuciscus, *the dace.* C. rutilus, *the roach.* C. erythrophthalmus, *the rud.* C. alburnus, *the bleak*, and C. brama, *the bream.*

75 Chondropterygii.

Order 6. Chondropterygii.

Accipenser sturio, *the sturgeon.* A. ruthenus, *the starlet.* A. huso, *the isinglass fish.*

Raia batis, *the skate.*

Petromyzon marinus, *the lamprey.* P. fluviatilis, *the lesser lamprey.* P. branchialis, *the lampern* or *pride.*

76 Of fish in general.

The wholesomeness of fish in diet has been much disputed. According to some, it is the most delicious food of any; and according to others, it is without strength or substance. It is certainly not adapted to be the sole diet of the laborious class, but it makes an excellent addition to vegetable food; for instance, with potatoes, or other roots, what can be more acceptable than a salted or smoked herring, to give a relish to such insipid diet? It is said, indeed, that one barrel of salted herrings will, in this way, go as far as three barrels of salted beef. Fresh fish is certainly well calculated for sedentary people, and those who reside in towns; and at all events, it is fortunate to have such a resource for food in a populous country, to be made use of when any exigency requires such aid.

The texture of fish, in general, is more tender than that of flesh. They have nothing of a fibrous structure, like flesh; of course, they are more easily digested than meat, especially such as are not of a viscid nature.

It is a singular circumstance regarding fish, that, though we require vegetables with our meat, we hardly ever take them with fish. Cullen says, that by way of experiment he has taken apples along with fish, but found them to disturb digestion.

The objections to fish, however, are numerous. The nourishment derived from them it is said, is incomplete; not so stimulating, nor so congenial to the nature of man, as either birds or quadrupeds; some classes of them also, as shell-fish, salmon, &c. are more indigestible than meat; and fish, in general, has a stronger tendency to putrefaction than meat. But the faults of fish are somewhat corrected by the manner in which they are commonly eaten. In a fresh state, sauces and pickles of an acid nature are employed with them, and when dried, the action of the stomach is promoted by salt and spices. Fish, compared with flesh, is less nourishing, and the more viscid sorts harder

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er of digestion. Hence many are under the necessity, after salmon, &c. to have recourse to a dram of some spirit or other to carry them off*.

* *Code of Health and Longevity*, vol. i. p. 407.

Class V. INSECTS.

77 Food from insects.

Of insects properly so called, none are used in substance as food, except various species of cancer, viz.

Cancer mœuas, *the common crab*. C. pagurus, *the black-clawed crab*. C. gammarus, *the lobster*. C. asteeus, *the craw fish*. C. serratus, *the prawn*. C. crangon, *the shrimp*, and C. squalla, *the white shrimp*.

Under this class we may rank *honey*, the produce of the bee, which in its general elementary properties agrees with sugar, to be afterwards noticed. It is, however, rather more heating, and will not agree with many stomachs. It is best eaten from the comb, as the wax seems to correct its unpleasant effects.

78 Food from worms.

Class VI. VERMES. Order 2. Mollusca.

The *sepia sepiola*, and the *echinus esculentus*, are the only edible genera of this order of worms, and even these are a coarse and by no means a nourishing food.

Order 3. Testacea.

Cardium edule, *the common cockle*.
Ostrea edulis, *the common oyster*.
Mytilus edulis, *the eatable muscle*.
Helix pomatia, *the common snail*.

Of these, the oyster and the snail are the most wholesome and digestible.

As occupying a middle rank between animal and vegetable food, we shall here notice *milk* and its various products.

79 Milk.

Milk is the proper and natural food of the young of all animals of the mammalia class; and cows milk makes a principal part of the daily diet of a great proportion of the human race, both in the infant and adult state. On account of the abundance of oily and cheesy matter which it contains, cow's milk is to infants by no means so well suited as human milk; but as the mode of living in civilized society often depraves the quality of woman's milk, or prevents its secretion, cows milk in too many instances becomes a necessary substitute. On such occasions, as it is too heavy to be given alone, it should be diluted with water: and as it is disposed to become more acescent than human milk, and from that cause to produce gripings and other disorders of the bowels in young children, it will often be useful to mix with it decoctions of animal substances, such as chicken or veal broth, or decoction of hartshorn shavings; of which last two ounces should be boiled in a quart of water, over a gentle fire, till the whole is reduced to a pint; when, after it is become cold, it will be of the consistence of a light jelly. This, mixed with about twice its quantity of cows milk, with the addition of a little sugar, forms for young subjects a proper aliment, approaching nearly to the nature of human milk.

Milk is used medicinally in consumptions, especially in their early stage; in gouty affections, after the paroxysm is gone off, in smallpox, diluted with water, as the common drink; in measles, especially the malignant kind, diluted in the same manner; in gonorrhœa, lues venerea, and during a mercurial salivation in cancerous affections; in cases where mineral and animal poisons, have been swallowed; in cases of strangury and dysury from the absorption of cantharides, &c.; in fluor albus; in many spasmodic and nervous disorders.

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When milk is used medicinally, it is often serviceable to dilute it with Pyrmont, Seltzer, or some other proper mineral water; and to prevent acidity, and make it sit easier on the stomach, lime water, and some of the distilled aromatic waters, are occasionally mixed with it. To obviate costiveness, which milk is apt to induce, it is often proper to mix brown sugar, or magnesia with it, to boil it with oatmeal, veal broth, &c.

In general, milk is improper in inflammatory fevers, unatteuded with pustulous eruptions; in bilious fevers; in scrophulous cases; and in rickets.

The following are the principal products and preparations of milk in dietetic and medicinal use; cream and butter are well known; nor can it be necessary to notice how much they disorder the stomach and bowels when taken too freely.

Curds taken in considerable quantity, are highly oppressive to the stomach, and not unfrequently prove the cause of obstructions and inflammations of the bowels.

80 Cheese.

Cheese varies according to the kind of milk from which it is prepared, according to the quantity of oil and whey which the coagulable matter contains, aud lastly according to its age. In general, it is an aliment suited only to strong stomachs, and to such persons as use great and constant exercise. In the higher orders of society, it is used chiefly as a condiment. Toasted cheese is not easily digested by weak stomachs; and for those who can be hurt by indigestion, or heated by a heavy supper, it is a very improper diet*.

* See *Cheese*.

81 Butter milk.

Butter-milk is milk which has been deprived of its oily matter by churning or agitation. It is nourishing, cooling, and diluent. It is used in cachexies, atrophies, consumptions, &c.

Whey is the watery, saccharine part of milk, freed in a great measure from the butyraceous and caseous matter. It is lightly nutritive, diluent, aperient, and diuretic. It is given in consumptions, dysenteries, jaundice, &c. alone, or mixed with mineral waters, and sometimes impregnated with the juices of medicinal herbs. Wine whey, tartar whey, mustard whey, will be particularly noticed in their proper places.

Sugar of milk is a saline substance, obtained from the whey by evaporation. It has been properly called the essential salt of milk. It has been much extolled by some writers as a remedy in consumptions; but as it is contained in whey, it is evident that preparation must possess all its virtues, and therefore that the trouble of obtaining it separate must be unnecessary†.

† *Synopsis of Mat. Aliment. and Med.* vol. i.

II. *FROM THE VEGETABLE KINGDOM.*

82 Of vegetable food in general.

Vegetable food is more ancient than any other. As forming the food of animals, it is the foundation of all our nourishment, for by it those animals are nourished, which in turn afford sustenance to man. Indeed there are no circumstances under which a diet of animal food should be solely employed. This has been confirmed by every experiment made; and the confinement of a person only for a few days to this mode of living, has induce

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Declaimers on the exclusive use of vegetable diet have not taken into view the various and new circumstances of situation in which man is now placed. He is no longer the child of nature, nor the passive inhabitant of one genial spot, as when he was first formed. He is now a citizen of the world at large; exertion and toil are his constant attendants, and he requires a more ready and assimilated nourishment than vegetable food can convey. In many situations also, the vigour of his system is weakened by extremes of temperature, which demand, to counteract them, the most stimulant and invigorating food he is capable of acquiring. The excellence of vegetable food used alone is therefore confined to a mild temperature and a passive state, and there it certainly deserves that preference which humanity and philosophy have bestowed upon it. Considering vegetable food as conveying a nourishment insufficient for our present civilized situation, we shall next state the inconveniences that attend its being used in excess. The first inconvenience of vegetable food already noticed, is its constant tendency to acescency; but this is hurtful only when it takes place to a morbid degree. If a natural tendency to acescency prevails in the stomach, as a step towards assimilation, it cannot fail to be noxiously increased by the sole use of vegetables; and the counteracting of this state, or checking the tendency to fermentation, must be the great secret in the regulation of vegetable diet. This secret no doubt depends on the preventing, by our choice of vegetables, excess in the proportion of fermentable or saccharine matter, and in exciting the action of the stomach, so that the vegetable food may not be too long retained upon it.

The next inconvenience alleged against vegetable diet is its difficulty of assimilation. That vegetable aliment is more difficult in being reduced to nourishment, seems generally admitted, and in the end it produces a greater quantity of fæces. When received into the stomach it is likewise specifically lighter than the gastric fluids. Hence it floats near the top of the stomach, and causes irritations. This uneasiness is not felt for some time after its reception, but afterwards it begins to operate on the upper orifice of the stomach. The difficulty, however, of assimilation that attends vegetable food, may be got the better of by a proper selection of it; and it will also be chiefly felt in weak stomachs, and will by no means affect the vigorous and robust. Dietetics.

A third inconvenience of vegetable food is its extrication of a considerable quantity of air, by which the stomach becomes distended, often to an enormous degree, and much uneasiness is produced in the adjacent organs. This extrication of air is common to all vegetables; it varies, however, extremely in different kinds of them; and it is from this circumstance that the flatulence and torpor is experienced, which succeeds a full meal of them. Hence all vegetables that contain much of it should undergo a previous preparation before being used as food.

These, then, are the chief inconveniences attending a vegetable regimen: while on the contrary, to counterbalance them, this species of diet is always found to promote or sharpen the appetite, and to keep the stomach in an active state. Neither are any constitutional disorders the consequence of it, as happens from animal food, for whatever morbid symptoms arise under its use are confined almost entirely to the stomach and bowels, and seldom carry any hurtful effects to the system at large. Neither do any evils arise from occasional excesses in its use; and the mischiefs of repletion or overfulness are avoided by it, unless in cases of extreme indolence, or where a continued course of intemperance is pursued as to the quantity taken. By its moderate stimulus it counteracts the disposition to an inflammatory state, and in many cases proves highly serviceable, in checking the violence, and arresting the progress of many constitutional diseases. Independently of its nature, it is of great importance to the stomach, by giving that proper distention which this organ requires in order to its healthy action.

The wisdom of nature has provided that the extent of vegetable food should be much greater than that of animal food, as the former is the foundation of nourishment for all the animated creation. Hence we find that there is scarcely any vegetable that does not afford nourishment to some animal; and there are many which, though naturally of a deleterious quality, can, by proper preparation, be converted into nourishment to man. Man, more than any other animal, is distinguished as to the choice of food which he makes; and in this selection he is generally determined by his taste, between which and the stomach nature has established such a sympathy, that what is disagreeable to the one, is seldom very digestible by the other. Hence inclination is to be particularly studied in every case of weakness of the stomach.

Among the other properties of vegetable food, it has been especially considered by all authors as having most influence on the powers of the mind, and in preserving a delicacy of feeling, a liveliness of imagination, and an activeness of judgment; but in proportion to these superior qualities, it must be observed, this state of body is equally the attendant of timidity, fluctuation, and doubt. Animal food, in the other extreme, gives a strong vigour and firmness of purpose, fitted for the most active exertions of life. By a mixture of diet these two extremes come to be counteracted; the body possesses a proper share of vigour; and, correspondent to it, the mind displays a firmness and capacity suited to every valuable purpose. The diet, then,

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then producing this state may be properly called temperance, without limiting the individual to an exact portion of either kind of food, or tying him up by the absurd and sickly system of Cornaro; and this state will be properly regulated by the experience and feelings of each individual, both in regard to the quantity and quality of his nourishment.

In the use of vegetable food, as well as animal, attention must be paid both to the proportion of it taken, and also to the state in which it is used. The first of these must be regulated by the three circumstances of season, way of life, and climate. With respect to the first—in summer the quantity of vegetable food should be always increased, whatever our habits may be; the propriety of this is evidently pointed out by nature, from its abundance at this period. This increase of vegetable food is also the more necessary if the appetite is naturally keen and healthy, as a more strongly nourishing aliment would at this time expose to all the effects of putrescency, which the increase of the vegetable diet will, on the contrary, counteract.

The way of life must also regulate a good deal the proportion of vegetable nourishment. An essential circumstance in the use of all diet, as we formerly remarked, is the production of such a distention of the stomach and bowels as may enable them to act properly on their contents. In the sedative and inactive, it is particularly desirable that this distention should be produced by food of a less nourishing kind, and that no more nourishment be received than what the wants of the system require. Hence in these cases, a vegetable diet is to be preferred, while, in the active and laborious, the plan should be reversed.

It is fact sufficiently established, that the proportion of vegetable food should be in a great measure regulated by the climate, as there is no doubt that the mortality of warm climates is aggravated by the use of too much animal food; and that a diet of a vegetable and acescent nature with a large proportion of condiment, such as we find used by the inhabitants of those countries, is best suited to the preservation of health; for by this excess of condiment, the morbid effects on the stomach and bowels, natural to vegetable food, are counteracted, and the chyle formed from them passes into the circulation in a proper state for supporting the body in such a situation. On the other hand, in a colder region a permanence of nourishment is required, which animal food particularly conveys; and as this nourishment is less apt to disorder the stomach or bowels, no great portion of condiment is necessary either as a stimulus to the organ, or in order to avoid any hurtful consequences that may arise. The proportion, therefore, of vegetable food is clearly pointed out to be small, and chiefly of the farinaceous or least acescent kind.

The state in which vegetable food is used is of equal importance with the proportion of it taken. Thus vegetable food particularly requires to be used in a fresh state; for, by being kept, many kinds of vegetable lose their peculiar flavour, their taste and smell, and in consequence of this become indigestible; this is particularly the case with the pulses, with herbs, and with fruits*.

* See *Nisbet on Diet.*

To these general remarks we shall subjoin a catalogue of esculent plants from Bryant's Flora Dietetica, distributed according to the method of that author, into roots, shoots, stalks, leaves, flowers, berries, stone fruit, apples, legumens, grain, nuts, and funguses. Dietetics.

I. ESCULENT ROOTS.

83 Esculent roots.

Sect. 1. Roots now or formerly made use of as Bread.

Arum colocasia, *Egyptian arum.* A. esculentum, *eatable arum.* A. peregrinum, *edders.*
Calla palustris, *water dragons.*
Convolvulus batatas, *Spanish potatoes.*
Dioscorea sativa. D. alata. D. bulbifera, *Indian yams.*
Jatropha maniot, *Indian bread.*
Nymphæa lotus, *Egyptian lotus.*
Sagittaria sagittifolia, *common arrowhead.*
Solanum tuberosum, *common potatoes.*
Yucca gloriosa, *Adam's needle.*
Polygonum divaricatum, *eastern buckwheat.*

Sect. 2. Roots occasionally eaten as Condiments, or for other family purposes.

Amomum zingiber, *common ginger.*
Allium cepa, *common onion.* A. ascalonicum, *shallot.* A. scordoprasum, *rokambole.*
Apium petroselinum, *common parsley.*
Bunium bulbocastanum, *earth-nut* or *pig-nut.*
Beta rubra, *red beet.*
Brassica rapa, *common turnip.* B. rapa punicea, *purple-rooted turnip.* B. rapa flavescens, *yellow-rooted turnip.* B. rapa oblonga, *long-rooted turnip.*
Campanula rapunculus, *rampion.*
Cochlearia armoracia, *horse-radish.*
Carum carui, *caraway.*
Cyperus esculentus, *rush nut.*
Daucus carota, *carrot.*
Eryngium maritimum, *sea holly*, or *eryngo root.*
Guilandina maringa, *Ceylon guilandina.*
Helianthus tuberosus, *Jerusalem artichoke.*
Ixia chinensis, *spotted ixia.* I. bulbifera, *bulb-bearing ixia.*
Lathyrus tuberosus, *earth nut.*
Orobus tuberosus, *heath peas.*
Orchis mascula, *male orchis.*
Pastinaca sativa, *the parsnip.*
Raphanus sativus, *the radish.*
Scorzonera hispanica, *viper's grass.*
Sium sisarum, *skirrets.*
Lilium martagan, *martagan lily.*
Tulipa gesneriana, *common tulip.*
Tragopogon pratense, *yellow goat's-beard.* T. porrifolium, *purple goats-beard.*

II. ESCULENT SHOOTS, STALKS, SPROUTS, AND PITHS.

84 Esculent shoots, stalks, &c.

Sect. 1. Shoots and Stalks.

Asparagus officinalis, *asparagus.*
Anethum azoricum, *sweet azorian fennel.*
Angelica archangelica, *angelica.*
Arctium lappa, *burdock.*
Asclepias syriaca, *greater Syrian dogsbane.*
Apium graveolens, *smallage.* A. dulce, *garden celery.*

Campanula

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Campanula pentagonia, *Thracian bell-flower.*
Cynara cardunculus, *cardoon*, or *chardoon.*
Carduus marianus, *milk thistle.*
Cnicus cernuus, *Siberian nodding cnicus.*
Chenopodium bonus henricus, *English mercury.*
Convolvulus soldanella, *sea bindweed.*
Cucubalus behen, *spatling poppy.*
Epilobium angustifolium, *rosebay willow herb.*
Humulus lupulus, *wild hops.*
Onoperdum acanthium, *cotton thistle.*
Rheum rhaponticum, *rhapontic rhubarb.*
Smyrnium olusatrum, *common alexanders.* S. perfoliatum, *round-leaved alexanders.*
Saccharum officinarum, *sugar-cane.*
Sonchus alpinus, *mountain sow-thistle.*
Tamus communis, *black briony.*
Tragopogon pratense, *yellow goat's-beard.* T. porrifolium, *purple goat's-beard.*

Sect. 2. Sprouts and Piths.

Areca oleracea, *cabbage-tree.*
Arundo bambos, *bamboo-cane.*
Brassica oleracea, *common cabbage.* B. O. viridis, *green savoy cabbage.* B. O. sabacida, *white savoy cabbage.* B. botrytis, *cauliflower.* B. B. alba, *white cauliflower.* B. B. nigra, *black cauliflower.* B. sabellica, *Siberian brocoli.* B. præcox, *early battersea cabbage.* B. rapa, *common turnip.*
Cyperus papyrus, *paper rush.*
Cycas circinalis, *sago palm-tree.*
Portulaca oleracea, *purslane.* P. latifolia, *broad-leaved garden purslane.*
Smilax aspera, *red berry, rough pine-weed.*

85 Esculent leaves.

III. ESCULENT LEAVES.

Sect. 1. Cold Salads.

Apium petroselinum, *parsley.* A. crispum, *curled-leaved parsley.*
Allium cepa, *common onion.* A. schænoprasum, *cives.* A. oleraceum, *wild garlic.*
Artemisia dracunculus, *taragon.*
Alsine media, *common chick-weed.*
Borago officinalis, *borage.*
Cacalia ficoides, *fig marigold-leaved cacalia.*
Cichorium endivia, *endive.* C. endivia crispa, *curled-leaved endive.*
Cochlearia officinalis, *scurvy grass.*
Erysimum alliaria, *Jack by the hedge.* E. barbarea, *winter cress* or *rocket.*
Fucus saccharinus, *sweet fucus* or *sea belts.* F. palmatus, *handed fucus.* F. digitatus, *fingered fucus.* F. esculentus, *edible fucus.*
Hypochæris maculata, *spotted hawk-weed.*
Lactuca sativa, *lettuce.*
Leontodon taraxacum, *dandelion.*
Lepidium sativum, *garden cress.* L. virginicum, *Virginian sciatic cress.*
Mentha sativa, *curled mint.* M. viridis, *spearmint.*
Oxalis acetosella, *wood sorrel.*
Poterium sanguisorba, *garden burnet.*
Primula veris, *common cowslips*, or *paigles.*
Rumex scutatus, *round-leaved sorrel.* R. acetosa, *common sorrel.*
Salicornia europea, *jointed glasswort*, or *saltwort.*

Scandix cerefolium, *common chervil.* S. odorata, *sweet cicely.* Dietetics.
Sedum reflexum, *yellow stonecrop.* S. rupestre, *St Vincent's rock stonecrop.*
Sisymbrium nasturtium, *water-cress.*
Sinapis alba, *white mustard.*
Tanacetum balsamita, *costmary.*
Valeriana locusta, *lamb's lettuce.*
Veronica beccabunga, *brooklime.*
Ulva lactuca, *green laver.*

Sect. 2. Boiling Salads.

Amaranthus oleraceus, *esculent amaranth.*
Arum esculentum, *Indian kale.*
Atriplex hortensis, *garden orach.* A. hortensis nigricans, *dark green garden orach.* A. hortensis rubra, *red garden orach.*
Anethum fœniculum, *common fennel.* A. dulce, *sweet fennel.*
Brassica oleracea, *cabbages.* B. napus, *colewort.*
Chenopodium bonus henricus, *English mercury.*
Cnicus oleraceus, *round-leaved meadow thistle.*
Corchorus olitorius, *common Jews mallow.*
Crambe maritima, *sea colewort.*
Jatropha maniot, *cassava.*
Malva rotundifolia, *dwarf mallow.*
Mentha viridis, *spearmint.* See Sect. i.
Phytolacca decandra, *American nightshade.*
Ranunculus ficaria, *pilewort.*
Raphanus sativus, *common radish.*
Salvia sclarea, *garden clary.*
Spinacia oleracea, *common spinach.* S. O. glabra, *smooth spinach.*
Thea bohea, *bohea tea.* T. viridis, *green tea.*
Urtica dioica, *common stinging nettle.*

86 Pot herbs.

Sect. 3. Pot Herbs.

Apium graveolens, *celery.* A. petroselinum, *parsley.*
Allium porrum, *leeks.*
Brassica oleracea, *cabbages.*
Beta vulgaris alba, *white beet.*
Crithmum maritimum, *rock samphire.*
Hyssopus officinalis, *common hyssop.*
Oxalis acetosella, *wood sorrel.*
Ozymum basilicum, *sweet-scented basil.*
Origanum marjorana, *common marjoram.* O. marjorana tenuifolia, *fine-leaved sweet marjoram.* O. heracleoticum, *winter sweet marjoram.* O. onites, *pot marjoram.*
Picris ochioides, *common ox-tongue.*
Rosmarinus officinalis, *common rosemary.* R. hortensis, *garden rosemary.*
Salvia officinalis, *green* and *red sage.* S. minor, *tea sage.*
Satureja hortensis, *summer savory.* S. montana, *winter savory.*
Scandix cerefolium, *common chervil.* S. odorata, *sweet cicely.*
Sonchus oleraceus, *common sow-thistle.*
Thymus vulgaris, *common thyme.* T. mastichinus, *mastic thyme.*

IV. ESCULENT FLOWERS.

87 Esculent flowers.

Calendula officinalis, *common marigold.*

Dietetics.

Caltha palustris, *marsh marigold.*
Capparis spinosa, *caper bush.*
Carthamus tinctorius, *safflower.*
Carlina acaulis, *dwarf carline thistle.*
Cynara cardunculus, *cardoon.*
Cynara scolymus, *green* or *French artichoke.* C. hortensis, *globe artichoke.*
Ceres siliquastrum, *common Judas-tree.*
Helianthus annuus, *annual sunflower.*
Onopordum acanthium, *cotton thistle.*
Tropæolum majus, *Indian cress.* T. minus, *smaller Indian cress.*

88 Esculent berries.

V. ESCULENT BERRIES.

Sect. 1. Indigenous or Native Berries.

Arbutus uva ursi, *bear-berry.* A. alpina, *mountain strawberry.* A. unedo, *common strawberry.*
Berberis vulgaris, *common barberry.*
Cratægus aira, *white beam tree.* C. terminalis, *maple-leaved service* or *sorb.*
Fragaria vesca vel sylvestris, *wood strawberry.* F. northumbriensis, *Northumberland strawberry.* F. imperialis, *royal wood strawberry.* F. granulosa, *minion wood strawberry.* F. pratensis, *Swedish green strawberry.* F. moschata, *hautboy strawberry.* F. moschata rubra, *red-blossomed strawberry.* F. moschata hermaphrodita, *royal hautboy.* F. chinensis, *Chinese strawberry.* F. virginiana, *Virginian scarlet strawberry.* F. V. coccinea, *Virginian scarlet-blossomed strawberry.* F. V. campestris, *wild Virginian strawberry.* F. chiloensis, *Chili strawberry.* F. C. devanensis, *Devonshire strawberry.*
Juniperus communis, *common* or *English juniper.* J. arbor, *Swedish juniper.*
Ribes rubrum et album, *red* and *white currants.* R. nigrum, *black currants.* R. grossularia, *gooseberries.*
Rosa canina, *dog's rose*, or *hep-bush.*
Rubus idæus, *raspberry.* R. I. albus, *white raspberry.* R. I. lævis, *smooth-stalked raspberry.* R. cæsius, *dewberry.* R. fruticosus, *common bramble.* R. chamæmorus, *cloudberry.* R. arcticus, *shrubby strawberry.*
Vaccinium myrtillus, *blackworts*, or *bilberry.* V. vitis idæa, *redworts.* V. oxycoccos, *cranberry.*

Sect. 2. Foreign Berries, often raised in gardens and stoves.

Annona muricata, *sour sop.* A. reticulata, *custard apple.* A. squamosa, *sweet sop.*
Bromelia ananas, *pine apple.* B. ananas pyramidato fructu, *sugar-loaf pine-apple.* B. karatas, *the penguin.*
Cactus opuntia, *prickly pear.* C. triangularis, *true prickly pear.*
Capsicum annuum, *annual Guinea pepper.* C. frutescens, *perennial Guinea pepper.*
Carica papaya, *the papaw* or *popo.* C. posoposa, *pear-shaped papaw.*
Chrysophyllum caineto, *star-apple.* C. glabrum, *sapadillo*, or *Mexican medlar.*
Citrus medica, *common citron.* C. limon, *common lemon.* C. americana, *the lime tree.* C. aurantium, *common orange.* C. decumanus, *shaddock orange.*
Crateva marmelos, *Bengal quince.*

Dietetics.

Diospyros lotus, *Indian date plum.* D. virginiana, *pishamin plum.*
Ficus carica, *common fig.* F. humilis, *dwarf fig.* F. caprificus, *hermaphrodite-fruited fig.* F. fructu fusco, *brown-fruited fig.* F. Fructu violaceo, *purple-fruited fig.* F. sycamorus, *sycamore*, or *Pharaoh's fig.*
Garcinia mangostana, *mangosteen.*
Morus nigra, *black-fruited mulberry.* M. rubra, *red-fruited mulberry.* M. alba, *white-fruited mulberry.*
Musa paradisaica, *plantain tree.* M. sapientum, *banana*, or *small-fruited plantain.*
Mespilus germanica, *medlar.*
Mammea americana, *the mammee.*
Malpighia glabra, *smooth-leaved Barbadoes cherry.* M. punicifolia, *pomegranate-leaved malpighia.*
Passiflora maliformis, *apple-shaped granadilla.* P. laurifolia, *bay-leaved passion-flower.*
Psidium pyriferum, *pear guava*, or *bay plum.* P. pomiferum, *apple guava.*
Solanum lycopersicum, *love apple.* S. melongena, *mad apple.* S. sanctum, *Palestine nightshade.*
Sorbus domestica, *true service apple.*
Trophis americana, *red-fruited bucephalon.*
Vitis vinifera, *common grapes.* V. apyrena, *Corinthian currants.*

VI. ESCULENT STONE FRUIT.

89 Esculent stone-fruit.

Sect. 1. Stone Fruit of Europe.

Amygdalus persica, *the peach.* A. nucipersica, *the nectarine.*
Cornus mascula, *male cornel*, or *cornelian cherry.*
Olea Europea, *manured olive.* O. sylvestris, *wild olive.*
Prunus armeniaca, *the apricot.* P. cerasus, *wild red cherry.* P. domestica, *the plum tree.* P. insititia, *the bullace tree.*
Rhamnus zizyphus, *common jujube.*

Sect. 2. Stone Fruit exotic.

Chrysobalanus icaco, *cocoa plum.*
Coccoloba uvifera, *sea-side grape.*
Cordiamyxa, *clustered sebesten*, or *Assyrian plum.* C. sebestena, *rough-leaved sebesten.*
Corypha umbraculifera, *umbrella palm.*
Elais guineensis, *oil palm.*
Eugenia jambos, *Malabar plum.*
Grias cauliflora, *anchovy pear.*
Laurus persea, *avigato pear.*
Mangifera indica, *mango tree.*
Phœnix dactylifera, *common date.*
Rhamnus jujuba, *Indian jujube.*
Spondias lutea, *yellow Jamaica plum.*

VII. ESCULENT APPLES.

90 Esculent apples.

Sect. 1. Apples of Herbaceous Plants.

Cucumis melo, *musk melon.* C. melo albus, *Spanish white melon.* C. M. lævis, *smooth green-fleshed melon.* C. M. flavus, *yellow white melon.* C. M. parvus, *small Portugal musk melon.* C. M. pilosus, *hairy-skinned melon.* C. M. reticulatus, *netted-skinned melon.* C. M. striatus, *late small striated melon.* C. M. tuberosus,

Dietetics. rosus, *warted cantaloupe.* C. M. turbinatus, *top-shaped melon.* C. M. virens, *green-rinded melon.*

Cucumis chale, *Egyptian melon.* C. sativus, *common prickly cucumber.* C. sativus albus, *white prickly cucumber.* C. S. longus, *long prickly cucumber.* C. flexuosus, *green Turkey cucumber.*

Cucurbita lagenaria, *bottle gourd.* C. citrullus, water melon. C. pepo, *common pompion.* C. P. oblongus, *long pompion.* C. verrucosa, *warted gourd.* C. melopepo, *Spanish melon.*

Melothria pendula, *small creeping cucumber.*

Sect. 2. APPLES of Trees.

Achras sapota, *oval-fruited sapota.*

Averrhoa carambola, *goa apple.* A. bilimbi, *bilimbia.*

Punica granatum, *pomegranate tree.*

Pyrus communis, *pear-tree.* P. malus, *the crab-tree.* P. cydonia, *quince-tree.*

91 Leguminous plants.

VIII. LEGUMINOUS PLANTS.

Sect. 1. PODS and SEEDS of Herbaceous Plants.

Arrachis hypogæa, *American ground nut.*

Cicer arietinum, *the chick pea.*

Dolichos soja, *East India kidney bean.*

Ervum lens, *lentil.*

Lotus edulis, *incurved podded bird's-foot trefoil.* L. tetragonolobus, *square-podded crimson pea.*

Lupinus albus, *white flowering lupine.*

Phaseolus vulgaris, *common kidney bean.* P. V. coccineus, *scarlet-flowering kidney bean.* P. albus, *white-flowering kidney bean.*

Pisum sativum, *common garden pea.* P. umbellatum, *crown pea.* P. quadratum, *angular-stalked pea.* P. maritimum, *sea pea.*

Vicia faba, *common garden bean.*

Sect. 2. PODS and SEEDS of Trees.

Cassia fistula, *sweet cassia*, or *pudding-pipe tree.*

Ceratonia siliqua, *carob*, or *St John's bread.*

Coffea Arabica, *Arabian coffee.* C. occidentalis, *American C.*

Cytisus cajan, *pigeon pea.*

Epidendrum vanilla, *sweet-scented vanilla.*

Hymenæa courbaril, *bastard locust tree.*

Tamarindus indica, *the tamarind.*

92 Esculent grains and seeds.

IX. ESCULENT GRAINS AND SEEDS.

Triticum æstivum, *summer* or *spring wheat.* T. hybernum, *winter* or *common wheat.* T. turgidum, *short thick-spiked wheat.* T. polonicum, *Poland wheat.* T. spelta, *German* or *spelt wheat.* T. monococcum, *St Peter's corn.*

Avena sativa, *manured black oat.* A. nuda, *naked oat.*

Hordeum vulgare, *common barley.* H. distichon, *long-eared barley.* H. hexastichon, *square barley.* H. zeocriton, *battledore* or *sprat barley.*

Secale cereale. *Common rye.*

Coix lachryma jobi, *Job's tears.*

Cynosurus cerocanus, *Indian cock's-foot grass.*

Festuca fluitans, *flote fescue grass.*

Holcus sorghum, *Guinea corn*, or *Indian millet.*

Nymphæa nelumbo, *Egyptian bean.* Dietetics.

Oryza sativa, *rice.*

Panicum miliaceum, *common millet.* P. Italicum, *Italian millet.*

Phalaris canariensis, *canary grass* or *canary seed.*

Polygonum fagopyrum, *buck wheat.*

Quercus esculus, *cut-leaved Italian oak.* Q. phellos, *carolinean willow-leaved oak.*

Sesamum orientale, *eastern sesamum.* S. Indicum, *Indian sesamum.*

Sinapis nigra, *black mustard.* S. arvensis, *wild mustard* or *charlock.*

Zea mays, *Maize*, or *Indian wheat.*

Zezanea aquatica, *water zezania.*

93 Esculent nuts.

X. ESCULENT NUTS.

Amygdalus communis, *sweet* and *bitter almond.*

Anacardium occidentale, *cashew nut.*

Avicenna tomentosa, *eastern anacardium*, or *Malacca bean.*

Corylus avellana, *hazel nut.*

Cocos nucifera, *cocoa nut.*

Fagus castanea, *common chesnut.*

Juglans regia, *common walnut.* J. nigra, *black Virginian walnut.*

Jatropha curcas, *Indian physic nut.* J. multifida, *French physic nut.*

Pinus pinea, *stone* or *manured pine.*

Pistacia vera, *pistachia nut.* P. narbonensis, *trifoliate-leaved turpentine tree.*

Theobroma cacao, *chocolate nut.*

Trapa natans, *Jesuit's nut.*

94 Esculent funguses.

XI. ESCULENT FUNGUSES.

Agaricus campestris, *common mushroom.* A. pratensis, *the champignion.* A. chantarellus, *chantarelle agaric.* A. deliciosus, *orange agaric.* A. cinnamomeus, *brown mushroom.* A. violaceus, *violet mushroom.*

Lycoperdon tuber, *the truffle.*

Phallus esculentus, *the morel.*

For the botanical arrangement and characters of these plants, see the article BOTANY. For a particular account of the individuals as articles of diet, we must refer our readers to Bryant's Flora Dietetica, Cullen's Materia Medica, vol. i. the synopsis of Materia Alimentaria and Materia Medica, and Sir John Sinclair's Code of Health and Longevity, vol. i. The preparation and use of bread have already been treated of at considerable length under that article. The use and best methods of preparing potatoes are given under AGRICULTURE, N° 288, &c.

95 Drinks.

B. DRINKS.

DRINKS may be divided into common water, vegetable infusions or decoctions, fermented liquors, animal fluids, and animal infusions or decoctions. The two last have been already spoken of, and water will be considered hereafter. We shall here only make a few observations on the second and third heads.

The vegetables employed for infusions or decoctions used as drink, are chiefly tea, coffee, and chocolate.

96 Tea.

All the various kinds of tea imported into this coun-

Dieteties. try, come under the denominations of bohea and green; and even these are supposed to be the produce of the same species of plant; though Linnæus has described them as specifically different, founding the distinction on the number of their petals. Others have observed a difference in the leaves. Still, however, it is uncertain whether these are not merely accidental differences, occasioned by diversity of soil, situation, and culture. While the present narrow and jealous policy of the Chinese continues, many interesting particulars respecting the natural history of this plant must remain unknown to Europeans.

It had been well for the inhabitants of Great Britain, if the tea-leaf had never found its way to this country; they would not then have been tormented, as thousands of them now are, with an incurable train of nervous symptoms, with stomachic and bowel complaints, with headach, &c. To the abuse of tea-drinking may be ascribed, in a great measure, the increased frequency of consumptions; and many of the disorders of children, and especially hydrocephalus, tabes mesenterica, rickets, &c. may be traced to the same source.

The tea-leaf, when fresh from the tree, is evidently poisonous. It is true that it loses some of its acrimony by drying: but even in the state in which it is sent to this country, it retains much of its narcotic nature. What serious mischief, then, are they bringing upon themselves, who, as is the case with too many of the lower class of society, make it a principal part of their daily subsistence! The money which should go to purchase wholesome and substantial food, is squandered away in procuring what of itself affords no nourishment at all; for whatever nourishment is derived from the infusion of tea, is owing to the sugar and milk which are added to it; and were it not for these additions, its deleterious effects would be much sooner and much more powerfully felt.

The time, it is to be hoped, is not far distant, when the poor shall be enlightened upon this important point. The next generation will hardly believe that their predecessors lavished away so much money, and took such extraordinary delight in defrauding their bodies of their proper and natural aliment, and in bringing upon themselves infirmity and disease. Let the rich and the intemperate indulge, if they choose, in the narcotic draught; to their heated and oppressed stomachs it may not do harm; it may even afford momentary relief. But let the poor abstain from it. They are not surcharged with high-seasoned food. They have no feverish thirst, no feverish heat to allay, after their noon-day repast. To them it is totally unnecessary as a help to digestion, and as an article of sustenance it is worthless and improper. They would, therefore, be better, infinitely better, without it.

Besides its narcotic quality, there is another property of the tea-leaf which renders its continued use injurious to the constitution; we mean its astringency. Add to these the warm water, and we have, in this unnatural beverage, the infusion of tea, three different powers concurring to disorder first the organs of digestion, and ultimately the whole system. Dieteties.

If it be asked, what are they who have been long accustomed to tea to substitute in its place; we answer milk, milk-porridge, gruel, broth, cocoa, or the like for breakfast; and in the afternoon, milk and water, orgeat, or lemonade in the summer, and coffee in the winter.

It should be understood, that the preceding remarks apply to the general abuse of tea as an article of sustenance; for its occasional employment in a dietetical and medicinal way in some kinds of sickness, is often of use. Thus, the simple infusion, without sugar or milk, is a good diluent and sedative in ardent fevers; and as it promotes perspiration and urine, it is frequently drunk with advantage in colds, catarrhs, rheumatism, headach, &c. It is also serviceable in cases of surfeit and indigestion *.

* *Synopsis of Materia Alimentaria.*

For the use and abuse of coffee, see the article COFFEE.

97 Chocolate. Chocolate is more nourishing and less heating than coffee. It is commonly made too thick, but when of a proper degree of strength, it is a very palatable and wholesome beverage, though on account of its oily quality it proves oppressive and cloying to some stomachs. See CHOCOLATE.

98 Cocoa. Cocoa is in fact only a weak chocolate; and being less pure than the former, weak chocolate might properly be substituted for it.

Of fermented liquors we shall mention only malt liquors, wine, and ardent spirits.

99 Malt liquors. Well fermented malt liquors, whether from barley or other grain, provided they be not too strong, are wholesome, refreshing, and strengthening drinks. As these liquors are very nutritious, they are chiefly suited to persons who lead a busy and active life. With sedentary and bilious persons they do not agree so well; and they are improper for the corpulent and asthmatic, and those who are liable to giddiness or other complaints of the head. They are better when of a middle age, than when kept very long. Beer made from the infusion of malted groats, or malted rye, is lighter and more diuretic than the common barley beer. Spruce beer is a powerful diuretic and antiscorbutic; it is, however, too cold for some constitutions. Bottled-beer is, on account of the fixed air which it contains, more refreshing than the barrelled. It is frequently prescribed as an antiseptic and restorative in low fevers and convalescencies; but care must be taken, during the use of it, that it do not operate too freely by stool. London porter, with the common properties of malt-liquor, possess such stomachic and diuretic qualities, as give it a preference over common beer and ale, in many cases. Being strongly impregnated with bitters of a narcotic kind, it is apt to induce drowsiness, and consequently is improper wherever there is a tendency to cephalagia, apoplexy, or other affections of the head (A).

(A) We cannot pretend to decide whether the prejudices that have for some time prevailed against the wholesomeness of London porter are well founded or not; but if its composition be such as given under the article BREWING, we are decidedly of opinion that it is a liquor quite unfit for constant drink.

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100 Wine.

A temperate use of wine is conducive to the health. All the functions, both of body and mind, are roused and facilitated by it. It has a powerful effect upon the organs of digestion, upon the circulation, and upon the nervous system, promoting digestion, strengthening the action of the heart and arteries, and raising the spirits. Such is its beneficial operation, when taken sparingly. In excessive quantities it has opposite effects, destroying the stomach, inducing emaciation and debility, and occasioning inflammation and obstruction in the liver, lungs, &c. whence gout, palsy, dropsy, consumptions, diabetes, &c.

In a dietetical view, wines are to be considered as they are, either acid or sweet, soft or austere. The acid wines, of which the Rhenish and Hock are the most noted, are the least heating, and the most diuretic. The sweet, such as the Frontiniac, Malaga, Tent, Cape, are heating and sudorific. The soft, or acidodulcescent wines, such as Champagne, Claret, Burgundy, Madeira, &c. are less stimulating than the sweet, and more cordial than the acid wines. Of the austere and astringent, that which is most used in this country is the red Port, which, when it has not been mixed with too large a proportion of brandy, is a generous and stomachic wine, well suited to the generality of British constitutions.

101 Perry and cyder.

Perry and cyder hold a middle place between wine and malt liquor. They are less nutritious than the latter, and less cordial than the former.

102. Ardent spirits.

In small quantities ardent spirits are a powerful cordial and corroborant, raising the pulse, strengthening the stomach, promoting digestion, and preventing flatulence. Taken sparingly, and diluted with water, they supply the place of wine, and with some constitutions agree better, as they are not like wine, disposed to create acidity. The abuse of them is productive of the same pernicious effects as those which arise from an excessive indulgence in wine, but in a greater degree. French brandy is the most bracing and stomachic; gin and rum the most diuretic and sudorific. Arrak, which is distilled from rice, is more heating than the two last. Whisky is considered as a lighter spirit than any of the former, from its containing less essential oil, and it therefore agrees better with most stomachs. The qualities of all these several sorts of spirits are improved by long keeping *.

* *Practical Synopsis of the Materia Alimentaria.*

On the general subject of drink, see the article DRINK.

103 Condiments.

C. CONDIMENTS.

CONDIMENTS are those substances which are taken with our food, to promote digestion, or to correct some hurtful property in the food taken. They are usually divided into saline, saccharine, aromatic, and oleaginous.

Of the saline condiments, the principal are common salt and vinegar.

104 Salt.

Common salt, by its stimulant action on the throat, gullet, and stomach, seems to promote the secretion of saliva and of the gastric juice, and thereby facilitates digestion. It also appears, when taken in small quantity, to increase the solubility of most foods, but when taken too plentifully, it renders the food hard and difficult of solution. Salted meats and fish are unwholesome when made a constant article of diet.

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105 Vinegar.

Vinegar in small quantities is a grateful and salutary stimulus to the stomach, correcting the putrescency of animal food, and the flatulency of vegetable. Its use is improper in many valetudinary cases, especially for calculous and gouty persons; in consumption and chlorosis; to rickety patients and young children.

Pickles may be considered as merely receptacles for vinegar, except in as far as the vegetables of which they are composed are in their nature warm and aromatic, as the onion.

106 Sugar.

Sugar is nutritious, antiseptic and laxative, and is considered as promoting the solution of fat in the stomach; but as it is very fermentable, it is apt, in many constitutions, to produce flatulence, heat, and thirst. Its unlimited use seems to be one cause of the increased and increasing frequency of bilious and hypochondriacal disorders. Chlorotic girls, rickety children, hysterical women, and all who are troubled with acidity in the stomach and bowels, should abstain from it; and those who are anxious to preserve their teeth white and sound, should not make free with it. To these observations, however, there are some constitutions which furnish exceptions. Thus we are told that one of the dukes of Beaufort took, for the space of 40 years, nearly a pound of sugar every day; yet it neither disordered any of the viscera, nor injured the teeth, and he lived to attain the age of 70.

107 Spices.

The aromatic condiments consist chiefly of the foreign spices, as pepper, Cayenne pepper, cinnamon, nutmeg, cloves, ginger, and a few garden roots and seeds, such as garlick, leek, onion, horse-radish, and mustard. Of these we shall take notice under their proper heads in the Materia Medica.

The oleaginous condiments consist merely of olive oil and butter.

108. Oil.

Oil when used as a seasoning to raw vegetables, checks their fermentation in the stomach, and thereby prevents them from proving too flatulent. Used in this manner, in small quantities, it proves a help to digestion; but when taken in considerable quantities, it has an opposite effect, and lays the foundation for bilious complaints.

109. Melted butter.

The moderate use of melted butter with boiled vegetables, is, in general, by no means unwholesome; but it frequently disagrees with bilious and hypochondriacal people.

The proper method of preparing food, constitutes the art of cookery, on which we shall present our readers with the following general remarks, taken from Sir John Sinclair's Code of Health and Longevity.

110 Cookery.

The primeval inhabitants of the earth certainly ate both their vegetable and animal food raw; and to this day some of the African nations, the Esquimaux Indians, the Patagonians and Samoedes, devour raw flesh and fish, and drink the blood of the animals. Raw flesh produces great bodily vigour, ferocity of mind, and love of liberty.

In general, however, animal food undergoes some preparation before it is consumed. It is hardly to be credited the shifts which some tribes have been put to, in order to obtain that object, as putting heated stones

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in the bellies of pigs to roast them, or burning the straw in order to parch the grain. From these humble attempts, the great refinements of cookery, which is properly a branch of chemistry, originated.

It is certain that cookery is an useful art. By it many articles are rendered wholesome, which could not otherwise have been eaten; but by it, at the same time, it must be acknowledged, that some articles are rendered unwholesome, which would otherwise have produced nourishing food.

By cookery, our foods are rendered more palatable and digestible, and when prepared in a simple manner, more conducive to health.

Cookery may be considered under two general heads, the simple, and the refined or compound.

111 Simple cookery.

The first, though apparently easy, requires a considerable degree of attention and experience; and the second is an art of so diversified and extensive a nature, that it is rarely carried to any considerable degree of perfection, and it would have been no loss to human nature if it had never been invented.

Simple cookery includes the following modes of dressing meat: 1. Roasting. 2. Boiling. 3. Stewing. 4. Broiling. 5. Frying. 6. Baking; and, 7. Digesting.

112 Roasting.

1. *Roasting* was certainly the first mode invented to prepare animal food; for boiling is a more complicated process, and required the art of manufacturing vessels that could withstand the effect of heat. Roasting, it is well known, requires a greater proportion of heat than boiling, and more skill in the preparation. By the application of fire, a considerable proportion of watery substance is exhaled from the meat. In order to be done properly, the roasting should be conducted in a gradual manner, and the heat moderately but steadily applied, otherwise exsiccation rather than roasting, takes place. Roasted meat is certainly the best means of consuming the flesh and tasting the natural juices of the meat. It is also peculiarly calculated for birds of every sort, and for young and tender meat, taking off its viscidity, and giving it a firmness and dryness that otherwise it would not possess.

Roasted meat, at least of the larger kinds, as beef, mutton, and venison, is preferred in England, and boiled or baked meat in France. The meat of England has not, perhaps, the same flavour as that of France, but it is larger, richer, and fatter, and appears to more advantage in a roasted state. Besides, coal fires are better adapted for that process of cookery than wood or peat. It is found, indeed, that meat, roasted by a fire of peat or turf, is more sodden than when coal is employed for that purpose.

Our meat in England (Cadogan asserts) is generally over-done, and particularly over-roasted. In regard to over-roasting, the action of fire, if continued too long, has a tendency to change mild animal flesh into something of another quality; the fat in particular, becomes bitter and rancid. The less, therefore, that all flesh meat undergoes the power of the fire, the milder and wholesomer it is. This doctrine, however, is denied by Falconer. He admits, that meat little done is the most soluble, but at the same time contends, that it is exceedingly alkalescent, and runs quickly into putrefaction. Hence the French, who live in a warm climate, find it necessary not only to eat a great quantity of bread, to prevent the putrefying effect of animal food, but also to have their meat thoroughly boiled and roasted.

Dietetics.

113 Boiling.

2. *Boiling* is also an excellent mode of preparing animal food, rendering it more soluble, without destroying, if properly done, its nutritious qualities, and being peculiarly calculated for weak stomachs. But however useful moderate boiling may be in these respects, yet, when carried to an extreme, every thing soluble is extracted, the nutritious parts are conveyed to the liquor, and the meat itself is left behind insipid, dense, and unfit for nourishment.

Young and viscid food, as veal, chickens, partridges, &c. are more wholesome when roasted than boiled, and easier digested; but beef and mutton are easier digested when boiled than roasted; consequently boiling such meat is better calculated for weak stomachs. Boiling is particularly applicable to vegetables, rendering them more soluble in the stomach, and depriving them of a considerable quantity of air, so injurious to weak stomachs.

The usual mode of preparing fish for the table is by boiling, roasting rendering them more indigestible.

It is proper to observe, that those who are trained to athletic exercises, have their meat roasted or broiled, and not boiled; as it is supposed, that, when boiled, a great part of the nutritive juices of the meat is lost in the water.

114 Stewing.

3. *Stewing* is reckoned the mode by which the greatest quantity of nourishment is derived from the meat. By this plan the texture of the meat is rendered more tender, its soluble parts are not fully extracted, and it is left in a state abundantly sapid and nourishing, while the soup also, or fluid, contains a sufficient proportion of the animal extract.

115 Broiling.

4. *Broiling*, consists in exposing meat to the near application of a naked fire, by which means its outer surface immediately hardens, before the heat has penetrated the whole. This prevents any excess of exhalation; and the meat, when done, is rendered sufficiently tender. It is peculiarly suited for steaks, which are, comparatively speaking, eaten in a juicy and almost in a raw state.

116 Frying.

5. *Frying* is a process that renders meat more indigestible than any other, and indeed, might be included under the head of compound cookery. It is performed by cutting meat into thin slices, and putting it into a vessel over the naked fire. As the lower surface of the meat would thus be burnt or hardened, some fluid matter, generally of an oily nature, is introduced, which acquires, from the heat, a burnt or empyreumatic taste, and becomes hardly miscible with the fluids in the stomach. It requires, therefore, the addition of stimulants to enable the stomach to digest it.

117 Baking.

6. *Baking* consists in the application of heat in a dry form, but in a vessel covered with a paste instead of its being exposed to the open air. Any considerable exhalation is thus prevented, and the meat, by the retention of all its juices, is rendered more sapid and tender. But baked meat sits heavy on some stomachs, from the greater retention of its oils, which are in a burnt state. It requires, therefore, the additional stimulus of spices and aromatics, to render it lighter, and to increase the power of the stomach to digest it.

118 Digesting.

7. *Digesting* is the last discovered process of simple cookery.

Dietetics. cookery. It is performed in a close vessel, and resembles boiling, being conducted in a very high temperature, while, from the closeness of the vessel, the advantages of stewing are procured. It is not, however, much in use.

119 Jellies. Besides these various simple modes of preparing animal food, there is another, which it may here be proper to take notice of, namely, when animal food is dissolved in water, and formed into a gelatinous solution or jelly. This substance is of a viscid nature, and though it contains much nourishment, yet is difficult of digestion, and of course less calculated for diseased or weak stomachs than is commonly imagined. Nor are those jellies, which are the mucilaginous extracts of certain parts of animals, as hartshorn, very digestible; indeed, a too liberal use of them has often proved injurious. They can only be recommended for the sick, accompanied with a quantity of stale bread. To those who require an article of that sort, more especially if their stomachs are weak, simple beef tea, properly prepared, is the most nutritive balsam that can be administered.

It may also be proper to observe, that even after provisions have been dressed in the kitchen, they have often to undergo some operations of cookery at the table; this is principally by the addition of some of the various sorts of seasoning or condiments.

120 Compound cookery. One would imagine that all the various modes of preparing food above enumerated, might satisfy the most luxurious appetite; but, instead thereof, the ingenuity of man has been exerted to discover a number of other preparations. Hence, a system of refined or compound cookery has been invented, more flattering to the palate than favourable to the health.

It would be improper to touch upon processes which it is impossible for any writer on dietetics to mention with any degree of approbation. Some dishes may be prepared, variously compounded, which may occasionally be tasted, and plain sauces may be a useful addition to fish and vegetables; but the generality of ragouts, made dishes, and the like, are of a poisonous quality, and cannot be too anxiously avoided by those who entertain any anxiety for the preservation of their health *.

* *Code of Health and Longevity*, vol. i.

The foregoing observations on diet are adapted chiefly to persons in health; but it is of great importance for a medical man to known what is the most proper diet for the sick and for convalescents. To treat this subject properly would occupy more room than we can allot to it; we shall, therefore, only insert here the following remarks by the late Dr Heberden, with which we shall conclude this part of the article.

121 Diet of sick and convalescent persons. "Many physicians appear to be too strict and particular in the rules of diet and regimen, which they deliver as proper to be observed by all who are solicitous either to preserve or recover their health. The common experience of mankind will sufficiently acquaint any one with the sorts of food which are wholesome to the generality of men; and his own experience will teach him which of these agrees best with his particular constitution. Scarcely any other directions besides these are wanted, except that, as variety of food at the same meal, and poignant sauces, will tempt most persons to eat more than they can well digest; they ought therefore to be avoided by all who are afflicted with any chronical disorders, or wish to keep from them. But whether meat should be boiled or roasted, or dressed in any other plain way, and what sort of vegetables should be eaten with it, we never yet met with any person of common sense who did not appear fitter to choose for himself than we could direct him. Small beer, where it agrees, or water alone, are the properest liquors at meals. Wine or spirits mixed with water have gradually led on several to be sots, and have ruined more constitutions than ever were hurt by small beer from its first invention. Dietetics.

"In fevers a little more restraint is necessary, but not so much as is often enjoined. The stronger sorts of meat and fish are most usually loathed by the sick themselves, nor could they be eaten without offending the stomach, and increasing the distemper, while it is at all considerable; but in its decline the sick are often desirous of some of the milder sorts of meat, and no harm follows from indulging their desire. The English are said to eat more meat when they are well than most other nations; but were remarkable, so long ago as the time of Erasmus, for avoiding it more scrupulously when they are sick than any other people. How high soever the fever be, the sick may be safely nourished with weak broths and jellies, and with any vegetable substances, if we except the acid and aromatic, or with the infusions or decoctions prepared from them; and we know no reason for preferring any of these to the rest. Eggs and milk have been, we know not by what authority, forbidden in all fevers; but as far as our experience goes, they both afford innocent food in the worst, where they are grateful to the patients.

"The feverish thirst is best allayed by pure water, which may be drunk either warm or cold, at the option of the sick person, and he may drink as much as he pleases; but we see no advantage in persuading him to gorge himself with liquids, as is often done, against his inclination and stomach. If water be deemed too insipid, currant jelly, and a variety of syrups, may be dissolved in it; or apples sliced or roasted, tamarinds, sage, or baum, or toasted bread, may be infused in it; or decoctions may be made of oatmeal, barley, or rice; or the water may be made into an emulsion with the oily seeds; all which, with a variety of similar substances, merely correct its insipidness, but in other respects leave it just what it was.

"There is scarcely any distemper, in every stage of which it may not be safely left to the patient's own choice, if he be perfectly in his senses, whether he will sit up or keep his bed. His strength and his ease are chiefly to be attended to in settling this point; and who can tell so well as himself, what his ease requires, and what his strength will bear?

"Doubts are often raised about the propriety of changing the linen in sickness, just as there have been about changing the foul air of the sick chamber by any of the means which could purify and refresh it. There can be very little reason to fear any mischief from the cold which the sick may feel while their clean linen is putting on; for their attendants, with common care, will do this as safely as many other things which must necessarily be done for them. But some have a strange opinion of harm from the smell of the soap perceivable in linen after it has been washed, and therefore allow not their patients, when they change their linen, even

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to put on fresh, but such only as have been worn, or lain in, by other persons. By this contrivance indeed the smell of the soap might be taken off; but few cleanly people would think they gained any advantage by the change. Now, if a faint smell of soap were noxious, then soap-makers and laundry servants must be remarkably unhealthy, which is contrary to experience; nor is it less so, that the sick are injured by the cleanness of what they wear; on the contrary, the removing of their foul things has often diffused over them a sense of ease and comfort, which has soon lulled them into a quiet and refreshing sleep*."

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* *Heberden's Commentaries.*

PART II. OF THE GENERAL ACTION OF REMEDIES AND THEIR CLASSIFICATION.

122 Action of remedies.

WE shall not attempt any new or original disquisition on the action of remedies, but shall merely state the most generally received opinions on the subject. We shall begin with the doctrine of the disciples of Cullen, which has been well expressed by Dr Percival in the following propositions.

123 Medicines act by an immediate and peculiar impression on the alimentary canal.

1. *Medicines may act on the human body by an immediate and peculiar impression on the stomach and bowels, either in their proper form, in a state of decomposition, or a change in the arrangement of their parts.*—The sympathy of the stomach with the whole animated system is so obvious to our daily experience, that it cannot require much illustration. After fasting and fatigue, we feel that a moderate quantity of wine instantly exhilarates the spirits, and gives energy to all the muscular fibres of the body. It has been known even to produce a sudden and large augmentation of weight, after much depletion, by rousing the absorbent system to vigorous action. Such power is peculiar to living mechanism; and is properly denominated by physicians, the *vis medicatrix naturæ*. But apparent as is the sympathy of the stomach, the laws by which it is governed are very insufficiently understood; and we have hitherto learned only from a loose induction of facts, that the nerves of this delicate organ seem to be endowed with diversified sensibilities; that impressions made by the same or different substances, have their appropriate influence on different and distant parts; and that the stomach itself undergoes frequent variations in its states of irritability. A few grains of *sulphate of copper*, taken internally, excite instantly the most violent contractions of the abdominal and other muscles concerned in vomiting. A dose of *ipecacuanha*, as soon as it produces nausea, abates both the force and velocity of the heart, in its vital motion; and affects the whole series of blood vessels, from their origin to their minutest ramifications, as is evident by the paleness of the skin under such circumstances, and by the efficacy of emetics in stopping hæmorrhages. The head, when disordered with vertigo, sometimes derives sudden relief from a tea-spoonful of ether, administered in a glass of water. An incessant cough has been known to attack the lungs, in consequence of the stimulus of a pin, which had been unwarily swallowed. Of the action of medicines on the stomach, under decomposition or recomposition, we have an example familiar to every one, in *carbonate of magnesia*. For this earth, by neutralizing the acid in the *primæ viæ*, acquires a purgative quality, and at the same time yields a gas of great salubrity, as an antiemetic, tonic, and antiseptic.

2. *Medicines may pass into the course of circulation in one or other of the states above described, and being conveyed to different and distant parts, may there produce certain appropriate effects.*—Chemistry furnishes us with numberless cases in which substances undergo changes, and take new forms more remarkable than can be effected by digestion, retaining still the *materia prima*, and being capable of resuming the original arrangement of their particles, and consequently their original qualities. Now, a body altered in its texture by digestion, and carried into the system with aliment, may acquire specific powers of acting on particular sound or diseased parts. Thus, if we suppose cantharides to be changed in form and texture, when mixed with the chyle, the lymph, or the blood, they may still, in that form and texture, be peculiarly adapted to excite strangury in the urinary passages, or, we may conceive that this new modification of their particles may again be altered, and their original composition restored by a subsequent chemical change in the kidneys. The sensible qualities of any body are no certain marks of its medicinal action. Peruvian bark does not owe its efficacy in fevers to its bitterness, for stronger bitters are not possessed of its febrifuge powers. Antimony, though insipid, produces a violent action on the nerves of the stomach, and yet if applied to the eye, an organ equally sensible, it is altogether inert. To what perceptible property in opium are we to ascribe its narcotic powers? or is there in the sweet taste of acetate of lead, any indication of a deadly poison? Numberless instances may be adduced to prove the uncertainty of reasoning otherwise than from observation, concerning the action of medicines, and the peculiar sensibility of different parts of our system to their impression. Following experience, therefore, as our guide, let us notice a few facts that may elucidate the subject before us. It is well known that madder root, when taken by an animal, carries its tinging qualities to the bones, affecting neither the skin, the muscles, the ligaments, nor the fat. Consequently this tinging quality is left unchanged by digestion; or perhaps it is again recovered, when arrived at the bones, by some new arrangement of parts produced by the chemistry of nature. Extract of logwood, taken internally, sometimes gives a bloody hue to the urine. But the astringency of it does not seem to accompany its colouring matter. We recollect no instance wherein the milk either of a nurse, or of an animal, was tinged with madder or logwood. This affords some presumption, that the pigment does not subsist in its proper form, in the blood; but that it is recovered by a subsequent change in the disposition of its constituent particles. And if one substance stain the bones, by being carried into contact with them, another may, in an analogous manner, produce in them fragility or dissolution.

124 Medicines produce effects on distant parts through the circulation.

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solution. In the disease termed by the French *ergot*, and which, with some probability is ascribed to the use of a species of unsound corn, the bones lose the earthy matter that enters into their texture; the gums become soft, and are easily broken. This effect is gradual, and probably arises from some unknown quality in the corn, which is either not taken away by digestion, or is resumed in the juices that circulate through the osseous vessels. A change in the process of vegetation may communicate a solvent power to an esculent seed. Mustard acquires this by its natural growth, and is capable of rendering even ivory soft and fragile. How far it would produce such an effect on the bones of a living body, if used as the chief article of diet, we have no experience on which to ground any satisfactory conclusion.

Sulphur, whether externally or interually used, produces a cure in the itch. In each way, therefore, we may presume its operation to be similar. But when taken into the stomach, there can be no doubt that it undergoes a change in the modification of its parts, and that it does not circulate through the blood vessels either in the form or with the properties of sulphur. Yet when conveyed to the surface of the body, it evidently appears to recover its original powers, communicating its peculiar odour to the perspiration, tinging silver, and curing cutaneous defocdations. The same holds true of the sulphuric acid, when administered in large doses. It seems to lose oxygen in the animal body, and to pass off by the pores, as hepatic air, or as volatilized sulphur. Even when given to nurses, it proves an effectual remedy for the itch, both in them and the children whom they suckle. Mercury combined with sulphur into the black sulphuret, has frequently been regarded as inert. Instances, however, have occurred in which, under this form, though accurately prepared, it has produced salivation; an evident proof, according to Dr Percival, of a chemical change in the sulphuret, by which the mercury was restored to its original powers. That mercury is capable of being reduced to the metallic form, and of collecting in considerable quantity in the human body, is proved by the concurrent testimony of many authors, who inform us that fluid mercury has been found in the carious bones of venereal patients. A salivation is sometimes produced by antimony. Dr James assured Sir George Baker, that he knew six instances of its being produced by his febrile powder, though he had left mercury out of its composition long before they occurred. Indeed, as the patients thus affected had neither their teeth loosened, nor their breath rendered offensive, there is no reason to suppose that the salivation was owing to a mixture of mercury in the powder.

Most persons have experienced the effects of asparagus on the urine. This takes place very speedily and strongly, though only a small quantity has been eaten. The smell is much more disagreeable than asparagus itself; and as the odorous particles conveyed to the kidneys must be greatly diluted in their passage, it is probable that a new combination of particles takes place in the urinary organs; and that the odorous part of the secretion differs in its form and quality from what subsisted both in the chyle and in the blood.

There are certain medicines which, when swallowed, quickly manifest themselves in the discharges, with some of their original qualities. A strong solution of potash, when taken in considerable quantities, renders the urine alkaline and lithontriptic, and the same excretion becomes impregnated with carbonic acid, if water impregnated with that acid be drunk freely. Dr Percival speaks of a patient to whom six grains of balsam of Tolu were given thrice a day, and whose urine was strongly scented by this small quantity. Garlick affects the breath, though it be applied only about the wrists; and the milk of a nurse is easily tainted with it. A purgative given to a woman that suckles will sometimes produce no effect on her bowels, but will operate strongly on those of her infant. A still more convincing proof that there may be a renovation of the original qualities of a body, after it has undergone the process of digestion, and other subsequent changes, is deducible from these facts; that butter is often impregnated with the taste and smell of certain vegetables on which the cows have pastured; that the milk of such cows discovers no disagreeable flavour, any more than the whey or cheese prepared from it. Now, butter is formed, first by a spontaneous separation of cream, and secondly, by a fermentation of it; that is, by a twofold and successive new arrangement of its elementary parts. By these changes, the originally offensive materials in the food of the cow seem to reassume their proper form and nature.

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After venesection the serum of the blood has sometimes appeared as white as milk, while the crassamentum retained its natural colour. This whiteness has been shewn to arise from oleaginous particles floating in the circulating fluids, and may serve to explain a fact recorded by a writer of good authority, on the natural history of Aleppo, that in certain seasons when oil is plentifully taken, the people become disposed to fevers, and infarctions of the lungs, which symptoms wear off by retrenching this indulgence. Some years ago cod-liver oil was annually dispensed amongst the sick of the Manchester hospital, to the amount of 50 or 60 gallons. The taste and smell are extremely nauseous, and it leaves upon the palate a savour like that of putrid fish. This remedy is more salutary when it operates by perspiration; and the sweat of those to whom it is administered, always becomes strongly tainted with it. An oil of the same kind forms no inconsiderable part of the food of many northern nations; and it is said to penetrate and imbue the deepest recesses of the body.

Dr Wright relates an experiment to prove that chalybeates do not enter the blood. He forced a dog that had fasted 66 hours, to swallow a pound of bread and milk, with which had been mixed an ounce and a half of sulphate of iron. An hour afterwards he opened the dog, and collected from the thoracic duct about half an ounce of chyle, which assumed no change of colour when tincture of galls was dropped into it, though it acquired from the same tincture a deep purple, when a quarter of a grain of sulphate of iron was dissolved in it. This experiment is usually deemed decisive in support of the opinion that chalybeates exert their operation solely on the stomach, and that the vigour they communicate to the system arises exclusively from their tonic powers on the alimentary canal, and from the sympathy of the stomach with various other parts of the body. Dr Percival was of opinion, that the tonic action and sympathy above mentioned, did

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not preclude the immediate agency of the steel on the remote parts of the human frame, as this remedy, in other forms capable of being introduced into the circulation, may exert considerable energy as a stimulant or astringent; and in his opinion, the experiment adduced proves that the iron did not exist in the chyle, in the state of a salt capable of striking a black colour with galls. Neither does the oxide of iron, nor the glass of iron, possess this power, yet, though changed, they are both capable of being restored to the metallic state. Perhaps with equal reason it might be presumed by one ignorant of chemistry, that the sulphate of iron contains no iron, because it is not acted on by the magnet.

With the foregoing experiments of Dr Wright, Dr Percival contrasts those made by the celebrated Dr Musgrave, who injected into the jejunum of a dog that had, for a day before, but little meat, about 12 ounces of a solution of indigo in fountain water, and, after three hours, opening the dog a second time, he observed several of the lacteals of a bluish colour, which on stretching the mesentery, did several times disappear, but was most easily discerned when the mesentery lay loose; an argument that the bluish colour was not properly of the vessels, but of the liquors contained in it. A few days after this, repeating the experiment in another company, with a solution of stone blue in fountain water, and on a dog that had been kept fasting 36 hours, he saw several of the lacteals become of a perfect blue colour, within very few minutes after the injection. For they appeared before he could sew up the gut.

About the beginning of March following, having kept a spaniel fasting 36 hours, and then syringing a pint of deep decoction of stone blue with common water, into one of the small guts; and after three hours, opening the dog again, he saw many of the lacteals of a deep blue colour: several of them were cut, and afforded a blue liquor, some of the decoction running forth on the mesentery. After this he examined the *ductus thoracicus*, and saw the receptaculum chyli, and that ductus, of a bluish colour; not so blue indeed as the lacteals, from the solution mixing, in or near the *receptaculum*, with *lympha*, but much bluer than the *ductus* used to be, or than the lymphatics under the liver were, with which he compared it.

Stone blue is a preparation of cobalt, potash, and white lead, which being converted into glass, is ground into fine powder. If such a substance can pervade the lacteals, we may conclude that they are permeable to other bodies, besides those designed for nutrition, and capable of assimilation with the blood. This argument from analogy, receives great additional force from the known fact, that mercury, and various other active remedies, may be conveyed into the body through the absorbents of the skin, a system of vessels similar to those above mentioned, in their structure, uses, and termination. In a case of *hydrocephalus internus*, on which Dr Percival was consulted, a child under one year of age, received, by successive frictions, 4 ounces 6 drams and 2 scruples of strong mercurial ointment between the 8th of February and the 7th of April 1786. One scruple was administered each time; the operation took up more than half an hour, and the part to which the ointment was applied, was always previously bathed with warm water; precautions which seemed to secure the full absorption of the mercury. The child recovered without any symptoms of salivation, and continued perfectly well. The doctor repeatedly observed, that very large quantities of mercurial ointment may be used in infancy and childhood, without affecting the gums, notwithstanding the predisposition to a flux of saliva, at a period of life incident to dentition.

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Whence is it that a medicine so irritating as mercury, can be conveyed into the course of circulation, when even milk, or the mildest liquors, if transfused into the blood vessels, have been found to produce convulsions and death? Is it that what passes by the lymphatics and lacteals is carried into the thoracic duct, and there mixed with a large portion of the chyle and lymph, by which its acrimony is sheathed and diluted, or its chemical properties changed, before it enters the mass of blood? For the absorbents of the skin, and of the intestines, seem to require a capacity to bear the stimulus of these extraneous bodies to which, in both situations, they are exposed.

125 Medicines act on fluids.

3. *Medicines introduced into the course of circulation may affect the general constitution of the fluids; produce changes in their particular qualities; superadd new ones; or counteract the morbific matter with which they may be occasionally charged.*—By observations on the hæmorrhages which have been sustained without destruction to life; from experiments made on animals, by drawing forth all their blood; and by a computation of the bulk of the arteries and veins, the mass of circulating fluids has been estimated at 50 pounds in a middle-sized man, of which 28 pounds are supposed to be red blood. Fluids bearing so large a proportion to the weight of the whole body, have assuredly very important offices in the animal economy. Endued with the common properties of other fluids, they are subject to *mechanical laws*; being variously compounded, they are incident to chemical changes; and, as they are contained in a living vascular system, their motions become subject to the influence of nervous energy *.

* See *Percival's Essays*, vol. ii.

The followers of Dr Brown explain the operation of medicines on the principle of their all acting as stimulants in a greater or less degree. This doctrine, with some modification, is thus detailed by Mr Murray.

126 Murray's account of the action of medicines.

"Medicines, in general, operate by stimulating the living fibre, or exciting it to motion. This proposition has even been stated as universal, and was received as an axiom, in a system superior, perhaps, to any, in conveying just and precise ideas on the nature of life, and the affections to which it is subject. Medicines, in common with all external agents, are, according to this system, incapable of directly altering the state of the vital power: they can only excite the parts possessed of that power to action; and however diversified their effects may appear to be, such diversities are to be referred merely to the different degrees of force in which they exert the general stimulant power they possess.

"This proposition cannot, however, be received in an unlimited sense. From the exhibition of different medicines, very different effects are produced, which cannot be satisfactorily explained from the cause assigned,—the difference in the *degree* of stimulant operation. They differ in *kind* so far, that even in the greater number of cases, one remedy cannot by any management of

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dose or administration, be made to produce the effects which result from the action of another.

"It is therefore necessary to admit of some modifications of the general principles above stated, and the following are perhaps sufficient to afford grounds for explaining the operation of remedies, and for establishing a classification of them sufficiently just and comprehensive.

"1. Stimulants are not to be regarded as differing merely in the degree of the stimulant operation which they exert. An important distinction exists between them, as they are more or less diffusible and permanent in their action. A stimulus is termed diffusible, which, whenever it is applied, or at least in a very short time after, extends its action over the whole system, and quickly produces its full exciting effect. A diffusible stimulus is generally also transient in its action; in other words, the effect, though soon produced, quickly ceases. There are others, on the contrary, which, though equally powerful stimulants, are slow and permanent. These varieties, which are sufficiently established, serve to explain the differences in the power of a number of the most important medicines; and they lay the foundation for the distinction of two great classes, narcotics and tonics, with their subordinate divisions of antispasmodics and astringents, both consisting of powerful stimulants; the one diffusible and transient, the other slow and permanent in their operations.

"There is a difference between stimulants, in their actions being directed to particular parts. Some, when received into the stomach, quickly act upon the general system; others have their action confined to the stomach itself, or at least, any farther stimulant effect they may occasion, is slow and inconsiderable; while a third class consists of those which operate on one part, often without producing any sensible effect on the stomach or general system. Some thus act on the intestinal canal, others on the kidneys, bladder, vessels of the skin, and other parts; the affection they excite in these, being the consequence, not of any stimulant operation equally extended over every part, but of one more particularly determined. This difference in the action of stimuli is the principal foundation of the distinctions of medicines into particular classes. Cathartics, for instance, are those medicines which, as stimuli, act peculiarly on the intestinal canal; diuretics, those which act on the secreting vessels of the kidneys; emmenagogues, those which act on the uterine system; diaphoretics, those which exert a stimulant action on the vessels of the skin. With these operations, medicines, at the same time, act more or less as general stimulants, by which each individual belonging to any class is thus rendered capable of producing peculiar effects; and many of them, by a peculiarity of constitution in the patient, or from the mode in which they are administered, frequently act on more than one part of the system, by which their effects are still farther diversified. Medicines, when thus determined to particular parts, are sometimes conveyed to those parts in the course of the circulation; more generally their action is extended from the stomach, or part to which they are applied, by the medium of the nervous system *."

* *Elements of Materia Medica and Pharmacy*, vol. i. p. 95.

Whatever medical system we may adopt, it is obvious that medicines can act on the human system only in two general modes; either as it is composed of inert matter, or as it forms a living organised system. In the first mode, medicines may act either mechanically or chemically; in the second, they act entirely through the medium of the vital principle. Therapeutics.

127 Arrangement of remedies.

The order in which the several subjects of the materia medica have been considered, is very different in different writers; and which is the most proper, has been disputed about, while many are of opinion that it is of little consequence which of them is followed. It has been generally thought proper to follow a plan, in which the subjects are, according to a certain affinity, brought together, so that a number of them might be, for the purpose of medicines, considered under the same view. Thus, Dr Boerhaave considered them in the order of the botanical system he had formed, and Linnæus in the order of his own system, in which he is followed by Bergius.

128 Botanical arrangement

It has been thought proper to follow the botanical affinities, in so far only as they can be thrown into natural orders; and, this, therefore, has been attempted by the learned Professor Murray of Gottingen: but from the imperfection of the botanical affinities in pointing out a similarity of medicinal virtues, this plan will not always unite subjects in the latter point of view; and when we consider that there are yet many plants which do not enter into any natural order, these must be disposed of in an arbitrary manner, and probably in an unconnected state. It must be owned, however, that though the scheme of botanical affinities does not entirely answer the purpose, yet it will still go a certain length, and ought not to be neglected in the subdivision of any general plan that may be assumed.

129 Arrangement according to sensible qualities.

It has been supposed by some to be a more eligible plan to unite the several substances, as they happen to be related by their sensible qualities; this method Cartheuser and Gleditsch have attempted. This certainly may have its use; but from what is said above respecting the imperfection of this scheme for investigating virtues, it will appear that it will not always unite subjects that ought to be united under the same view; and it will be found, that in the authors mentioned, who have executed it in the best manner possible, the desired effect is by no means produced.

130 Alphabetical arrangement.

From the difficulty of rendering any of those plans tolerably exact and perfect, some writers have deserted all of them, and thought it best to throw the several articles into an alphabetical order, as Newmann and Lewis have done. If, however, there can be any advantage from bringing subjects of some affinity together, this alphabetical order is the most unfit for the purpose, as by separating similar substances, it must be perpetually distracting to the student. It can therefore have no advantage but that of a dictionary, in referring readily to any particular subject that may be inquired after; but this advantage can be obtained in every plan by means of an index, which cannot be saved even in an alphabetical work, as the different names under which the same substances are known necessarily requires an index comprehending all those different names.

Similar to those of the alphabetical order, are those plans which, after arranging the several articles of the materia medica according to the part of the plant employed, as roots, leaves, &c. have thrown these again into an alphabetical order, as Alston and Vogel have

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done; but it is obvious that this establishes no connexion between the subjects that follow one another, and can have no advantage over the alphabetical order. Further, by separating the consideration of the several parts of vegetables, it will both separate subjects that ought to be considered together, and will occasion unnecessary repetition.

131 Arrangement according to medical effects.

Dr Cullen was of opinion that, as the study of the materia medica is truly the study of the medicinal virtues, so the plan that arranges the several substances according to their agreeing in some general virtues, will be the best adapted to acquiring the knowledge of these, and will most readily inform the practitioner what different means he can employ for his general purpose. It will also inform him how far the several similar substances may differ in their degree of power, or how far, from the particular qualities assigned to each, he may be directed or limited in his choice.

As it seems proper that every practitioner ought, as far as possible, to practise upon general indications; so it is evident that his study of the materia medica is especially to know the several means that can answer these. Such a plan, therefore, must be the most proper for giving a student instruction; and if, while medicines are arranged according as they answer general indications, the particulars be likewise thrown together as far as possible according to their sensible qualities and botanical affinities, this plan will have the advantage of any other that has been proposed for presenting together the subjects that ought to be considered at one and the same time, and give the best means of recollecting every thing that relates to them.

132 Cullen's arrangement.

Dr Cullen's plan of arrangement is as follows.

He first divides all the substances contained in the materia medica into two general heads, the first comprising alimentary substances, or meats, drinks, and condiments; the second comprising medicines properly so called. These latter he considers as they act on the solids or the fluids. Those which act on the solids he distinguishes into such as act on the simple solids, under which he ranks astringents, tonics, emollients, and escharotics; and those which act on the living solids, under which he classes stimulants, sedatives, including narcotics, refrigerants, and antispasmodics. Of those medicines which act on the fluids, he conceives that some operate by producing a change on their fluidity, as attenuants and inspissants; or, on the mixture of their component parts, by correcting acrimony, either in general, as demulcents, or in particular as antacids, antalkalines, and antiseptics. Others he supposes to act by producing an evacuation of superabundant fluids; and under this head he includes errhines, sialagogues, expectorants, emetics, cathartics, diuretics, diaphoretics, and emmenagogues.

In his general classification, Dr Cullen has been followed by several writers on the materia medica and therapeutics. Some of the titles of his classes have indeed become obsolete, and his order has been almost totally changed by succeeding writers.

Of those who have copied Dr Cullen's arrangement with some modification, there is perhaps none that deserves more attention than the anonymous author of the "Thesaurus Medicaminum," and a "Practical synopsis of the materia alimentaria and materia medica." This author distributes the articles of the materia medica into 12 classes; 1 Evacuants, comprising errhines, sialagogues, expectorants, emetics, cathartics, diuretics, diaphoretics, emmenagogues; 2. Emolients, comprising diluents and emulcents; 3. Absorbents; 4. Refrigerants; 5. Antiseptics; 6. Astringents; 7. Tonics; 8. Stimulants; 9. Antispasmodics; 10. Narcotics; 11. Anthelmintics; and, 12. Heteroclites: this last being formed to include those articles that could not properly be reduced under the former heads.

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133 Arrangement of the practical synopsis.

On this classification we may remark, that the general term of evacuants might have been omitted, and its subdivisions might have properly been made distinct classes, as the articles they contain frequently act a more important part, than merely producing an evacuation of fluids. The class of *absorbents* includes those which Cullen calls antacids, and perhaps this latter term is to be preferred, as it is more explicit and better understood. The class *antiseptics* might also have been omitted, and the substances it contains might more properly have been arranged under other heads.

134 Mr Murray's arrangement.

Mr Murray's arrangement, which is very ingenious, is founded principally on the doctrine of universal stimulus, and he thus explains the principles on which it is established.

"Those stimulants, which exert a general action on the system, may first be considered. Of these there are two well-marked subdivisions, the diffusible and the permanent; the former corresponding to the usual classes of narcotics and antispasmodics; the latter, including likewise two classes, tonics and astringents. In these there is a gradual transition passing into the one from the other, from the most diffusible and least durable stimulus, to the most slow and permanent in its action.

"The next general division is that comprising local stimulants; such are the classes of emetics, cathartics, expectorants, sialagogues, errhines, and epispastics. These all occasion evacuation of one kind or other, and their effects are in general to be ascribed, not to any operation exerted on the whole system, but to changes of action induced in particular parts.

"After these, those few medicines may be considered whose action is merely mechanical or chemical. To the former belong diluents, demulcents, and emollients. Anthelmintics may perhaps be referred with propriety to the same division. To the latter, or those which act chemically, belong antacids or absorbents, lithontriptics, escharotics, and perhaps refrigerants.

"Under these classes may be comprehended all those substances capable of producing salutary changes in the human system. Several classes are indeed excluded which have sometimes been admitted; but these have been rejected, either as not being sufficiently precise or comprehensive, or as being established only on erroneous theory.

"The subdivisions of these classes may sometimes be established on the natural affinities existing among the substances arranged under each; on their chemical composition; their resemblance in sensible qualities; or, lastly, on distinctions in their medicinal virtues, more minute than those which form the characters of the class. In different classes one of these methods will frequently be found preferable to any of the others."

Mr

Therapeutics. Mr Murray's arrangement will be best understood from his own table.

A. General Stimulants.

a. Diffusible. { Narcotics. Antispasmodics.
b. Permanent. { Tonics. Astringents.

B. Local Stimulants. Emetics. Cathartics. Emmenagogues. Diuretics. Diaphoretics. Expectorants. Sialagogues. Errhines. Epispastics.

C. Chemical Remedies. Refrigerants. Antacids. Lithontriptics. Escharotics.

D. Mechanical Remedies. Anthelmintics. Demulcents. Diluents. Emollients *.

* *Murray's Elements.*

135 Darwin's arrangement. It would be improper here to omit the classification of the ingenious Dr Darwin, which was published in his *Zoonomia*. He distributes the articles of the materia medica under seven heads, according to his opinion of their mode of operation. They are as follows.

1. *Nutrientia*, or those things which preserve in their natural state the due exertions of all the irritative motions.

2. *Incitantia*, or those things which increase the exertions of all the irritative motions.

3. *Secernentia*, or those things which increase the irritative motions which constitute secretion.

4. *Sorbentia*, or those things which increase the irritative motions which constitute absorption.

5. *Invertentia*, or those things which invert the natural order of the successive irritative motions.

6. *Revertentia*, or those things which restore the natural order of the inverted irritative motions.

7. *Torpentia*, those things which diminish the exertions of all the irritative motions.

136 Nutrientia. The *nutrientia* he thus enumerates according to what he conceives to be their degree of nourishing power.

I. 1. Venison, beef, mutton, hare, goose, duck, woodcock, snipe, moor-game.

2. Oysters, lobsters, crabs, shrimps, mushrooms, eel, tench, barbolt, smelt, turbot, sole, turtle.

3. Lamb, veal, sucking-pig.

4. Turkey, partridge, pheasant, fowl, eggs.

5. Pike, perch, gudgeon, trout, grayling.

II. Milk, cream, butter, butter-milk, whey, cheese.

III. Wheat, barley, oats, pease, potatoes, turnips, carrots, cabbage, asparagus, artichoke, spinach, beet, apple, pear, plum, apricot, nectarine, peach, strawberry, grape, orange, melon, cucumber, dried figs, raisins, sugar, honey. With a great variety of other roots, seeds, leaves, and fruits.

IV. Water, river-water, spring-water, calcareous earth. Therapeutics.

V. Air, oxygen, azote, carbonic acid gas.

VI. Nutritive baths and clysters, transfusion of blood.

VII. Condiments.

137 Incitantia. Under *incitantia* (or stimulants) he ranks the following articles.

I. Papaver somniferum, poppy, opium.

Alcohol, wine, beer, cyder.

Prunus lauro-cerasus, *laurel*; distilled water from the leaves.

Prunus cerasus, *black cherry*; distilled water from the kernels.

Nicotiana tabacum, *tobacco?* the essential oil, decoction of the leaf.

Atropa belladonna, *deadly nightshade*; the berries.

Datura stramonium, *thorn apple*; the fruit boiled in milk.

Hyoscyamus reticulatus, *henbane*; the seeds and leaves.

Cynoglossum, *hounds-tongue.*

Menispermum, cocculus, *Indian berry.*

Amygdalus amarus, *bitter almond.*

Cicuta, *hemlock.* Conium maculatum?

Strychnos nux vomica?

Delphinum staphisagria?

II. Externally, heat, electricity.

III. Ether, essential oils.

IV. Oxygen gas.

V. Passions of love, joy, anger.

VI. Labour, play, agitation, friction.

138 Secernentia. The *secernentia* he distinguishes into diaphoretics, sialagogues, mild diuretics, mild cathartics, mild errhines, which, as they will be enumerated presently, it is unnecessary to mention here; and besides these, he enumerates the following circumstances acting on the other secretions.

Secretion of mucus of the rectum is increased by cantharides, by spirit of turpentine.

Secretion of subcutaneous mucus is increased by blisters of cantharides, by application of a thin slice of the fresh root of white briony, by sinapisms, by root of horse-radish, cochlearia armoracia, *volatile alkali.*

Secretion of tears is increased by vapour of sliced onion, of volatile alkali. By pity, or ideas of hopeless distress.

Secretion of sensorial power in the brain is probably increased by opium, by wine, and perhaps by oxygen gas added to the common air in respiration.

139 Sorbentia. The *sorbentia* he divides into those which affect the skin, as sulphuric or muriatic acids, various acid fruits, and opium; and the oxides of lead, zinc, and mercury, applied externally.

II. Such as affect the mucous membranes, as the juice of sloes and crab-apples, cinchona, and opium, internally; and externally the sulphate of copper.

III. 1. Such as affect the cellular membrane, as Peruvian bark; wormwood, *artemisia maritima*, *artemisia absynthium*; worm-seed, *artemisia santonicum*; chamomile, *anthemis nobilis*; tansey, *tanacetum*; bogbean, *menyanthes trifoliata*; centaury, *gentiana centaurum*; gentian

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tian, *gentiana lutea*; artichoke leaves, *cynara scolymus*; hop, *humulus lupulus*.

2. Orange peel, cinnamon, nutmegs, mace.

3. Vomits, squill, digitalis, tobacco.

4. Bath of warm air, of steam.

IV. Such as affect the veins, as water-cress, *sisymbrium nasturtium aquaticum*; mustard, *sinapis*; scurvy-grass, *cochlearia hortensis*; horse radish, *cochlearia armoracia*; cuckoo flower, *cardamine*; dog's grass; dandelion, *leontodon taraxacon*; celery, *apium*; cabbage, *brassica*. Chalybeates, bitters, opium, after sufficient evacuation; and externally vinegar, friction, and electricity.

V. Such as affect the intestines, including several astringents, and of the antacid earths,

VI. Such as affect the liver, stomach, and other viscera, as oxide of iron, filings of iron, sulphate of iron, sulphate of copper, sulphate of zinc, calomel, tartrate of antimony and potash, acetate of lead, and white arsenic.

VII. Such as affect venereal ulcers, including various preparations of mercury.

VIII. Such as affect the whole system, as evacuations by venesection and catharties, followed by the exhibition of opium.

IX. External *sorbentia*, as solutions of mercury, zinc, lead, copper, iron, arsenic, or metallic oxides applied in dry powder. Bitter vegetables in decoctions and in dry powers, applied externally; as Peruvian bark, oak bark, leaves of wormwood, of tansey, chamomile flowers or leaves. Electric sparks or shocks.

X. Bandage spread with *emplastrum è minio*, or with carpenter's glue mixed with one-twentieth part of honey.

XI. Portland's powder, and the use of hops in beer, both of which, when continued, are pernicious.

140 Invertentia.

Under the class of *invertentia* Dr Darwin ranks the ordinary emetics, violent cathartics, violent errhines and sialagogues; violent diuretics, and cold sudorifics, such as poisons, fear, and approaching death.

141 Revertentia.

His catalogue of *revertentia* is as follows:

I. Inverted motions which attend the hysteric disease, are reclaimed, 1. By musk, castor. 2. By asafœtida, galbanum, sagapenum, ammoniacum, valerian. 3. Essential oils of cinnamon, nutmeg, cloves, infusion of pennyroyal, *mentha pulegium*, peppermint, *mentha piperita*, ether, camphor. 4. Spirit of hartshorn, *oleum animale*, sponge burnt to charcoal, black snuffs of candles, which consist principally of animal charcoal, wood-soot, oil of amber. 5. The *incitantia*, as opium, alcohol, vinegar. 6. Externally the smoke of burnt feathers, oil of amber, volatile salt applied to the nostrils, blisters, sinapisms.

II. Inverted motions of the stomach are reclaimed by opium, alcohol, blisters, crude mercury, sinapism, camphor and opium externally, clysters with asafœtida.

III. Inverted motions of the intestinal lymphatics are reclaimed by mucilaginous diluents, and by intestinal *sorbentia*, as rhubarb, logwood, calcined hartshorn, Armenian bole; and, lastly, by *incitantia*, as opium.

IV. Inverted motions of the urinary lymphatics are reclaimed by cantharides, turpentine, rosin, the sorbentia, and opium, with calcareous earth, and earth of alum, by oil externally, warm bath.

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V. Inverted motions of the intestinal canal are reclaimed by calomel, aloe, crude mercury, blisters, warm bath, clysters with asafœtida, clysters of ice waters: or of spring water further cooled by salt dissolved in water contained in an exterior vessel? Where there exists an introsusception of the bowel in children, could the patient be held up for a time with his head downwards, and crude mercury be injected as a clyster to the quantity of two or three pounds?

142 1. Torpentia.

The *torpentia* he divides into 13 general heads. Venesection and arteriotomy; 2. Cold water, cold air, and the respiration of air with a diminished proportion of oxygen; 3. Vegetable mucilages; 4. Vegetable acids; 5. Animal mucus, hartshorn jelly, veal and chicken broth, and perhaps oil, fat and cream? 6. Mineral acids; 7. Silence and darkness; 8. Invertentia in small doses, as nitre, emetic tartar, and ipecacuanha, given so as to induce nausea; 9. Antacids, as soap, alkalies, and earths; 10. Medicines preventive of fermentation, as sulphuric acid; 11. Anthelmintics; 12. Lithontriptics; and, 13. Various external remedies, as the warm bath, poultices, oil, fat, wax, plasters, oiled silk, and carbonic acid gas on cancers and other ulcers.

We were for some time at a loss what arrangement we should follow in the present article. It was evidently necessary to adopt one that should, as much as possible, prevent repetition; and it therefore appeared improper to treat particularly of the articles of the materia medica under the usual classes. The alphabetical order would prevent repetition; but it seemed little adapted to the plan of a systematic treatise. On the whole, we have judged it best to arrange the individual articles in two methods; 1st, Into classes according to their supposed operation on the system; and in this view consider their general uses; and, 2dly, To treat of them more particularly under an arrangement similar to that of Linnæus. In the remainder of this part of the article, we shall therefore consider the general action and use of the various classes of remedies, adopting, with the exclusion of *emmenagogues*, the arrangement followed in Dr Kirby's Tables of the Materia Medica; and in a succeeding part we shall consider the individual articles under the four heads of animal, vegetable, mineral, and gaseous substances.

Class I. EMETICS.

143 Definition of emetics.

Emetics are such medicines as are calculated to excite vomiting, and thus discharge the contents of the stomach.

144 Table of emetics.

Table of Emetics.

I. Animal Products.

Murias ammoniæ, *muriate of ammonia.*

Aqua carbonatis ammoniæ, *water of carbonate of ammonia.*

II. Vegetable Products.

Anthemis nobilis, *chamomile flowers.*
Asarum europeum, *asarabacca.*
Centaurea benedicta, *holy thistle.*

Cephaëlis

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Cephaëlis ipecacuanha, *ipecacuanha.*
Vinum ipecacuanhæ, *ipecacūanha wine.*
Nicotiana tabacum, *tobacco in clysters.*
Olea europea, *olive oil.*
Scilla maritima, *squill.*
Acetum scillæ maritimæ, *vinegar of squills.*
Sinapis alba, *mustard.*

III. Mineral Products.

Sulphas cupri, *sulphate of copper.*
Sulphuretum antimonii, *sulphuret of antimony.*
Oxidum antimonii cum sulphure vitrificatum, *vitrified oxide of antimony with sulphur.*
Vinum antimonii, *antimonial wine, L.*
Tartris antimonii, *tartrite of antimony.*
Vinum tartritis antimonii, *wine of tartarised antimony.*
Sulphas zinci, *sulphate of zinc.*

145 Effects and uses of emetics.

The general effects produced by emetics are, a sensation of uneasiness in the stomach, followed by sickness, retching and vomiting. During the nausea, the pulse is feeble, quick, and sometimes irregular, and the countenance is pale; but when the vomiting comes on, the pulse grows quicker, and the face flushed. After the vomiting has ceased, the sickness or nausea commonly goes off entirely, though it sometimes remains in a distressing degree. The patient feels languid, heavy, and disposed to sleep. The skin usually feels moist, and the pulse continues weak for some time, but gradually grows fuller and slower.

To consider emetics merely as evacuants of the stomach, would be to take a very contracted and imperfect view of their effects; for if traced through the whole of their operation in the various diseases in which they are employed, their influence over the human body appears so manifold and extensive, that they may be justly reckoned amongst the most powerful instruments which the Materia Medica affords. Hence, besides their use as cleansers of the alimentary canal, they serve to induce sweating in fevers; to favour expectoration in disorders of the lungs; to promote absorption in cases of dropsy; and to remove certain obstructed conditions of the viscera, such as jaundice and suppression of the menses; also in cases of glandular and lymphatic obstructions, and in some cases of pulmonary consumption. By means of their peculiar action on the nervous and vascular system, they allay the spasms in asthma, and check the discharge of blood in hæmorrhages from the lungs and uterus. In the first of these, viz. in spitting of blood, they have been given with advantage by Dr Robinson, and still more lately by Dr Stoll of Vienna; who says, that in such cases ipecacuanha sometimes acts like a charm, seeming to close the open vessels of the lungs sooner and more effectually than any other remedy. In the other, viz. in uterine hemorrhagy, small doses only of these medicines, so as to excite sickness, but not vomiting, are found to answer best. But in both these instances they should be administered with caution, since it sometimes happens that they do more harm than good. Dr Cullen once met with an accident of this kind, in which the vomiting increased the hemorrhagy to a great and dangerous degree.

Dysentery is to be added to the number of diseases in which emetics have a peculiarly beneficial effect. Therapeutics.

When there is much visceral inflammation; where there are symptoms of great accumulation in the vessels of the head; in the advanced stages of pregnancy, and in cases of intestinal hernia, medicines of this class are to be avoided. And, in general, persons who have weak and delicate stomachs should be cautious of employing them too freely, since, as Dr Cullen has remarked, frequent vomiting renders the stomach less fit to retain what is thrown into it, and even weakens its powers of digestion *.

* *Thesaurus Medicaminum*, 3d edition, p. 32.

Class II. EXPECTORANTS.

146 Definition of expectorants.

Those medicines are called expectorants, that are employed to promote the excretion of pus or mucus from the windpipe and lungs. In general they are emetics given in smaller doses, though there are several medicines, especially some of the gum resins, that are considered to act in this way, without any tendency to excite vomiting.

147 Table of expectorants.

The following articles are usually employed in this country as expectorants.

I. Vegetable Products.

Cephaëlis ipecacuanha, *ipecacuanha.*
Nicotiana tabacum, *tobacco.*
Scilla maritima, *squill.*
Acetum scillæ maritimæ, *vinegar of squill.*
Syrupus scillæ maritimæ, *syrup of squills.*
Oxymel scillæ, *oxymel of squill.*
Tinctura scillæ, *tincture of squill.*
Pilulæ scilliticæ, *squill pills.*
Conserva scillæ, *conserve of squills.*
Allium sativum, *garlic.*
Syrupus allii, *syrup of garlic.*
Ammoniacum, *gum ammoniac.*
Lac ammoniaci, *milk of ammoniac.*
Arum maculatum, *wake-robin.*
Conserva ari, *conserve of arum.*
Colchicum autumnale, *meadow saffron.*
Syrupus colchici autumnalis, *syrup of colchicum.*
Oxymel colchici, *oxymel of colchicum.*
Ferula asafœtidæ, *asafœtida.*
Lac asafœtida, *milk of asafœtida.*
Hyssopus officinalis, *hyssop.*
Marrubium vulgare, *horehound.*
Myrrha, *myrrh.*
Pimpinella anisum, *aniseseed.*
Oleum volatile pimpinellæ anisi, *oil of anisesced.*
Polygala senega, *seneka root.*
Decoctum polygalæ senegæ, *decoction of seneka.*
Styrax benzoin, *benjamin.*
Acidum benzoicum, *benzoic acid.*
Tinctura benzoes composita, *compound tincture of benjamin.*
Alcohol, *spirit of wine.*
Æther sulphuricus, *sulphuric æther.*

II. Mineral Products.

Sulphuretum antimonii, *sulphuret of antimony.*

Tartris

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Tartris antimonii, *tartrite of antimony.*

Vinum tartritis antimonii, *wine of tartrite of antimony.*

Sulphuretum antimonii precipitatum, *precipitated sulphuret of antimony.*

Sulphur sublimatum, *flowers of sulphur.*

Sulphur sublimatum lotum, *washed flowers of sulphur.*

Oleum sulphuratum, *sulphurated oil.*

Petroleum sulphuratum, *sulphurated petroleum.*

Trochisci sulphuris, *sulphur lozenges.*

III. Gaseous Products.

Gas hydrogenium, *hydrogen gas.*

Gas hydrogenium carbonatum, *carbonated hydrogen gas.*

Vaporis aquæ calidæ inhalatio, *inhaling the steams of warm water.*

148 Effects and uses of expectorants.

The mode in which expectorants promote the excretion of pus or mucus from the lungs, does not appear to be well understood. Some suppose that those which are properly emetic, operate by the sympathy that exists between the stomach and lungs, and that the rest operate by some specific action. Mr Murray supposes that there are various modes of operation by which certain remedies will appear to promote expectoration, and which will give them a claim to the title of expectorants.

Thus, in certain diseases the exhalant vessels in the lungs seem to be in that state, by which the exhalation of fluid is lessened, or nearly stopped, and in such cases expectoration must be diminished. Any medicine capable of removing that constricted state, will appear to promote expectoration, and will at least relieve some of the symptoms of the disease. It is apparently by such a mode of operation, that antimony, ipecacuanha, squill, and some others, promote expectoration in pneumonia, catarrh, and asthma, the principal diseases in which expectorants are employed.

There is a case of an opposite kind, that in which there is a redundance of mucus in the lungs, as occurs in humoral asthma, and *catarrhus senilis.* In these affections, certain expectorants are supposed to prove useful. If they do so, it is probably by being determined more particularly in their action to the pulmonary vessels, and by their moderate stimulus diminishing the secretion, or increasing the absorption, thus lessening the quantity of fluid, and thereby rendering the expectoration of the remainder more easy. The determination of these substances to the lungs is often perceptible by their odour in the air expired. A similar diminution of fluid in the lungs may be effected by determining to the surface of the body; and those expectorants which belong to the class of diaphoretics probably act in this manner.

Expectorants, then, are to be regarded, not as medicines which directly assist the rejection of a fluid already secreted, but rather as either increasing the natural exhalation where it is deficient, or diminishing the quantity of fluid where it is too copious, either by stimulating the pulmonary vessels, or by determining to the surface. In both cases expectoration will appear to be promoted or facilitated*.

* *Murray's Elements,* vol. i. p. 326.

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The definition of these remedies points out the cases to which they are applicable, viz. those in which an accumulation of pus or mucus takes place in the bronchial cells, as catarrh, pneumonia in its suppurative stage, peripneumonia notha, asthma, and phthisis pulmonalis or consumption.

Class III. DIAPHORETICS.

149 Definition of diaphoretics.

Diaphoretics are those remedies that are intended to promote, keep up, or restore the excretion of perspirable matter from the skin; and of these some act but feebly, and only increase the insensible perspiration, while others act more powerfully, and under favourable circumstances, excite sweating. Hence we may divide them into two orders.

A. THE MILDER DIAPHORETICS.

150 Table of diaphoretics.

I. Animal Products.

Murias ammoniæ.

Aqua carbonatis ammoniæ.

Carbonas ammoniæ, *carbonate of ammonia.*

Alcohol ammoniatum, *ammoniated alcohol.*

II. Vegetable Products.

Anthemis nobilis, *chamomile tea.*

Centaurea benedicta, *holy thistle tea.*

Myrrha.

Allium sativum.

Acidum acetosum, *acetous acid* or *vinegar.*

Acidum acetum destillatum, *distilled vinegar.*

Aqua acetitis ammoniæ, *water of acetated ammonia.*

Arctium lappa, *burdock decoction.*

Artemisia abrotanum, *southern-wood tea.*

Aristolochia serpentaria, *snake-root.*

Tinctura aristolochiæ serpentariæ, *tincture of snake-root.*

Daphne mezereum, *mezereum.*

Decoctum daphnes mezerei, *decoction of mezereum.*

Dorstenia contrayerva, *contrayerva.*

Pulvis contrayervæ compositus, *compound powder of contrayerva.*

Fumaria officinalis, *fumitory.*

Laurus sassafras, *sassafras tea.*

Salvia officinalis, *sage tea.*

Sambucus nigra, *elder.*

Succus bacci sambuci spissatus, *inspissated juice of elder.*

Smilax sarsaparilla, *sarsaparilla.*

Decoctum smilacis sarsaparillæ, *decoction of sarsaparilla.*

Solanum dulcamara, *bitter sweet decoction.*

Supertartras potassæ, *supertartrate of potash* or *cream of tartar.*

B. STRONGER DIAPHORETICS, OR SUDORIFICS.

I. Animal Products.

Moschus moschiferus, *musk.*

Mistura moschata, *musk mixture.*

II. Vegetable

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II. Vegetable Products.

Aconitum neomontanum, *aconite.*
Succus spissatus aconiti napelli, *inspissated juice of aconite.*
Guaiacum officinale, *guaiacum wood and resin.*
Decoctum guaiaci officinalis compositum, *compound decoction of guaiacum.*
Tinctura guaiaci officinalis, *tincture of guaiacum.*
Tinctura guaiaci ammoniata, *ammoniated tincture of guaiacum.*
Laurus camphora, *camphor.*
Mistura camphorata, *camphorated mixture.*
Emulsio camphorata, *camphorated emulsion.*
Papaver somniferum, *opium.*
Tinctura opii, *tincture of opium.*
Tinctura opii camphorata, *camphorated tincture of opium.*
Tinctura opii ammoniata, *ammoniated tincture of opium.*
Pulvis ipecacuanhæ et opii, *powder of ipecacuan and opium.*
Rhododendron chrysanthum, *yellow-flowered rhododendron.*

III. Mineral Products.

Sulphuretum antimonii, *sulphuret of antimony.*
Tartris antimonii, in small doses.
Vinum tartritis antimonii.
Sulphuretum antimonii præparatum.
Sulphur stibii fuscum, *brown sulphuret of antimony.*
Oxidum antimonii cum phosphate calcis, *oxide of antimony with phosphate of lime*, or *James's powder.*
Antimonium calcinatum, *white oxide of antimony.*
Calx stibii præcipitatum. D. *Precipitated oxide of antimony*, or *powder of Algaroth.*
Sulphur sublimatum, *flowers of sulphur.*
Sulphur sublimatum lotum.
Sulphur præcipitatum, *precipitated sulphur*, or *milk of sulphur.*
Hydrargyrum, *mercury.*
Hydrargyrum purificatum, *purified mercury.*
Submurias hydrargyri, vel calomelas, *submuriate of mercury*, or *calomel.*
Balneum calidum, *hot bath.*
Balneum vaporis, *vapour bath.*

151 Effects and uses of diaphoretics.

Diaphoretics act in one of two ways; some by exciting an increased action of the exhalant vessels of the skin immediately, or by sympathy with other parts, as the application of heat, the warm bath, friction, &c.; while others promote perspiration, by increasing the general force of the circulating system, and thus acting on the exhalant vessels of the skin.

The action of diaphoretics is assisted by moderate warmth and by tepid diluent liquors frequently taken.

The immediate effects of these medicines are partly a diminution of the quantity of fluids in the body, but principally a change of the determination of blood from other parts to the surface. They perhaps also increase the action of the absorbents, and thus remove the spasmodic constriction of the subcutaneous vessels. Therapeutics.

The cases to which diaphoretic medicines are best adapted, are inflammatory fevers, rheumatism, asthma, dyspepsia, obstinate diarrhœa, and protracted dysentery. They are injurious in typhus fever, especially towards its commencement.

Where the force of the circulation is very great, it is proper, before the exhibition of diaphoretics, to premise the use of some other evacuation, as bleeding or purging.

Class IV. DIURETICS.

152 Definition of diuretics.

These are such medicines as promote or increase the excretion of urine.

The principal diuretics are these.

153 Table of diuretics.

I. Animal Products.

Lytta vesicatoria, *cantharides.*
Tinctura meloes vesicatorii, *tincture of cantharides.*
Oniscus asellus, *millepedes*, or *wood-lice.*

II. Vegetable Products.

Asarum europæum, *asarabacca.*
Nicotiana tabacum, *tobacco.*
Scilla maritima, *squill.*
Tinctura scillæ, *tincture of squill.*
Colchicum autumnale, *meadow saffron.*
Syrupus colchici, *syrup of colchicum.*
Oxymel colchici, *oxymel of colchicum.*
Acetum colchici, *vinegar of colchicum.*
Polygala senega, *seneka root.*
Decoctum polygalæ senegæ, *decoction of seneka.*
Acetum acetosum, *acetous acid.*
Acetas potassæ, *acetate of potash.*
Daphne mezereum, *mezereum.*
Decoctum daphnes mezerei, *decoction of mezereum.*
Smilax sarsaparillæ, *sarsaparilla.*
Decoctum sarsaparillæ compositum, *compound decoction of sarsaparilla.*
Solanum dulcamara, *bittersweet.*
Supertartras potassæ, *supertartrate of potash.*
Allium cepa, *onion.*
Cissampelos pareira, *pareira brava.*
Cochlearia armoracia, *horse-radish.*
Copaifera officinalis, *balsam of Copaiba.*
Cynara scolymus, *artichoke.*
Digitalis purpurea, *foxglove.*
Juniperus communis, *juniper.*
Spiritus juniperi communis compositus, *compound spirit of juniper.*
Oleum juniperi communis, *oil of juniper.*
Juniperus lycia, *olibanum.*
Leontodon taraxacum, *dandelion.*
Pinus sylvestris, *common turpentine.*
Oleum volatile pini purissimum, *purified oil of turpentine.*
Pinus larix, *Venice turpentine.*
Spartium scoparium, *green broom.*
Ulmus campestris, *elm bark.*
Decoctum ulmi, *decoction of elm bark.*

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III. Mineral Products.

Hydrargyrum, *mercury.*
Murias hydrargyri, *corrosive muriate of mercury.*
Nitras potassæ, *nitrate of potash.*
Nitrum purificatum, *purified nitre.*
Acidum nitrosum, *nitrous acid.*
Spiritus ætheris nitrosi, *spirit of nitrous æther.*

154 Effects and uses of diuretics.

The operation of diuretics is greatly promoted by plentiful dilution, which should by no means be withheld from dropsical patients, though, for many years past, the contrary method has too much prevailed. The medical world is much indebted to Sir F. Milman, for the pains he has taken to show the propriety of indulging such patients in the free use of liquids. In confirmation of the propriety of this method, the observation of the late Dr Cullen may be added. He has remarked that he always thought it absurd in physicians to employ diuretics while they enjoined an abstinence from drink, which is almost the only means of conveying these diuretics to the kidneys. Whenever, therefore, he employed diuretics, he at the same time advised drinking freely; and he was persuaded that drinking largely often contributed to the cures he made.

It is obvious, says Mr Murray, that a diuretic effect will be produced by any substance capable of stimulating the secreting vessels of the kidneys. All the saline diuretics seem to act in this manner. They are received into the circulation, and passing off with the urine, stimulate the vessels, and increase the quantity secreted.

There are other diuretics, the effect of which appears to arise not from direct application, but from an action excited in the stomach, and propagated by nervous communication to the secreting urinary vessels. The diuretic operation of squill, and of several other vegetables, appears to be of this kind.

There is still, perhaps, another mode in which certain substances produce a diuretic effect, that is, by promoting absorption. When a large quantity of watery fluid is introduced into the circulating mass, it stimulates the secreting vessels of the kidneys, and is carried off by the urine. If, therefore, absorption be promoted, and if a portion of serous fluid, perhaps previously effused, be taken up, the quantity of fluid secreted by the kidneys will be increased. In this way digitalis seems to act. Its diuretic effect, it has been said, is greater when exhibited in dropsy, than it is in health.

On the same principle may probably be explained the utility of mercury in promoting the action of several diuretics.

The action of these remedies is promoted by drinking freely of mild diluents. It is also influenced by the state of the surface of the body. If external heat be applied, diuresis is frequently prevented, and diaphoresis produced. Hence the doses of them should be given in the course of the day, and the patient, if possible, be kept out of bed.

The direct effects of diuretics are sufficiently evident. They discharge the watery part of the blood, and by that discharge they indirectly promote absorption over the whole system*.

* *Murray's Elements.*

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Diuretics are now seldom employed, except in cases of dropsy, and here they not unfrequently fail of success. They are, however, occasionally used in calculous or gravelly complaints, in gonorrhœa, to diminish plethora, or check profuse perspiration.

Class V. CATHARTICS.

155 Definition of cathartics.

Cathartics are those medicines which promote or increase the evacuation of excrementitious matter, or of serous fluids, from the bowels.

There are two principal objects which modern physicians have in view in the administration of cathartics; one is, merely to empty the bowels, and bring off the excrementitious matter contained in them, which is already out of the course of circulation; the other, to stimulate the exhalant vessels of the bowels, and thus promote an increased secretion of serous fluids which they pour into the alimentary canal; in this way, diminishing the general mass of fluids in the body. Hence these medicines are naturally divided into laxatives and purgatives, the latter of which are often termed drastic purgatives. It is true that these orders of cathartics differ only in degree of power, as such a quantity of a laxative may be given as to induce purging, while the dose of a purgative may be so diminished as to prove only gently laxative. As, however, the division is useful in some respects, we shall here preserve it, and shall distribute our list of cathartics into laxatives and purgatives.

A. *Laxatives.*

156 Table of cathartics.

I. Animal Products.

Mel, *honey.*
Mel despumatum, *clarified honey.*

II. Vegetable Products.

Anthemis nobilis, *clysters of chamomile decoction.*
Olea europæa, *olive oil.*
Supertartras potassæ, *supertartrate of potash.*
Tartras potassæ, *tartrate of potash.*
Tartras potassæ et sodæ, *tartrate of potash and soda*, or *Rochelle salt.*
Cassia fistula.
Electuarium cassiæ, *electuary of cassia.*
Cassia senna, *senna.*
Pulvis sennæ compositus, *compound powder of senna.*
Electuarium cassiæ sennæ, *electuary of senna.*
Infusum sennæ simplex, *simple infusion of senna.*
Infusum sennæ tartarisatum, *tartarised infusion of senna.*
Infusum tamarindi cum senna, *infusion of tamarinds with senna.*
Tinctura sennæ composita, *compound tincture of senna.*
Ficus carica, *figs.*
Fraxinus ornus, *manna.*
Syrupus mannæ, *syrup of manna.*
Prunus domestica, *prune.*
Rosa damascena, *damask rose.*
Syrupus rosæ centifoliæ, *syrup of damask roses.*
Saccharum officinarum, *brown sugar.*

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Tamarindus indica, *tamarinds.*
Viola odorata, *sweet violet.*
Syrupus violæ odoratæ, *syrup of violets.*

III. Mineral Products.

Sulphur sublimatum, *flowers of sulphur.*
Sulphur sublimatum lotum.
Sapo hispanus, *Castile soap.*

B. *Purgatives.*

I. Animal Products.

Cervus claphus, *hartshorn.*
Phosphas sodæ, *phosphate of soda.*

II. Vegetable Products.

Nicotiana tabacum, *clysters of tobacco,* or *of tobacco smoke.*
Sambucus nigra, *elder.*
Pinus sylvestris, larix, } *clysters of turpentine.*
Aloe perfoliata, *soccotrine aloes.*
Pulvis aloes cum canella, *powder of aloes with canella.*
Pilulæ aloeticæ, *aloetic pills.*
Pilulæ aloes cum colocynthide, *pills of aloes with colocynth.*
Vinum aloes soccotrinæ, *aloes wine.*
Tinctura aloes soccotrinæ, *tincture of soccotrine aloes.*
Bryonia alba, *bryony.*
Convolvulus jalapa, *jalap.*
Pulvis jalapæ compositus, *compound powder of jalap.*
Extractum jalapæ, *extract of jalap.*
Tinctura convolvuli jalapæ, *tincture of jalap.*
Convolvulus scammonia, *scammony.*
Pulvis scammonii compositus, *compound powder of scammony.*
Pulvis scammonii cum aloe, *powder of scammony with aloes.*
Electuarium scammonii, *electuary of scammony.*
Cucumis colocynthis, *colocynth,* or *bitter apple.*
Extractum colocynthidis compositum, *compound extract of colocynth.*
Gratiola officinalis, *hedge hyssop.*
Helleborus niger, *black hellebore.*
Extractum hellebori nigri, *extract of black hellebore.*
Helleborus fœtidus, *stinking hellebore.*
Iris pseudacorus, *common flag.*
Linum catharticum, *purging flax.*
Momordica elaterium, *wild cucumber.*
Succus spissatus momordici elaterii, *elaterium.*
Rhamnus catharticus, *buckthorn.*
Syrupus rhamni cathartici, *syrup of buckthorn.*
Rheum palmatum, *rhubarb.*
Infusum rhei palmati, *infusion of rhubarb.*
Vinum rhei palmati, *rhubarb wine.*
Tinctura rhei palmati, *tincture of rhubarb.*
Tinctura rhabarbari composita, *compound tincture of rhubarb.*
Tinctura rhei et aloes, *tincture of rhubarb and aloes.*
Tinctura rhei et gentianæ, *tincture of rhubarb and gentian.*
Ricinus communis, *castor oil.*
Stalagmitis cambogioides, *gamboge.*

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III. Mineral Products.

Sulphuretum antimonii, *sulphuret of antimony.*
Tartris antimonii, in very small doses.
Hydrargyrum, *mercury.*
Submurias hydrargyri, *submuriate of mercury.*
Submurias hydrargyri præcipitatus, *precipitated submuriate of mercury.*
Pilulæ hydrargyri, *mercurial pills.*
Nitras potassæ.
Sulphas potassæ, *sulphate of potash.*
Murias sodæ, *sea salt.*
Sulphas sodæ, *sulphate of soda,* or *Glauber's salt.*
Sulphas magnesiæ, *sulphate of magnesia,* or *Epsom salt.*

157 Effects and uses of cathartics.

The operation of a purgative medicine on the intestinal canal, may be considered as threefold: First, it stimulates the muscular fibres of the intestines, quickens their action, and thus increases the natural peristaltic motion of the bowels, in consequence of which their contents are more quickly discharged. Secondly, the exhalant vessels are stimulated by it, which terminate in the inner coat of the intestines, and it excites them to pour forth a greater discharge of fluids, as well as the mouths of the excretory ducts of the mucous glands, by which the natural mucus of the intestines is greatly augmented; and hence the evacuations by stool are not only quicker, but the excrementitious matter is thinner and more copious. Thirdly, the stools are rendered still more abundant, by an additional portion of the fluids furnished by the neighbouring viscera, the liver pancreas, &c. to which the stimulus of a purgative, of the more active sort in particular, extends. It is probable that these effects are communicated to the whole range of the intestinal canal, from the upper orifice of the stomach to the lower extremity of the rectum, or anus.

From the view we have now taken of the primary effects of cathartics on the bowels, we may easily understand how far they may prove useful in some diseases, and injurious in others; and how we may vary the degree of their activity under different circumstances.

When we consider the great length of the alimentary canal, with the numerous vessels and mucous follicles, as well as the hepatic and pancreatic ducts, which open on its internal surface, it will be evident that purgatives, even though they be not very stimulant, may occasion a great general evacuation, and consequent diminution of the mass of fluids, by opening at once all those outlets. From this it appears, that, next to bloodletting, purging will form one of the most active remedies in acute inflammatory diseases, where we wish to avoid an over distension of the vessels, and restrain the preternatural increase of the powers of the circulating system. Accordingly, purging constitutes a principal part of what is termed the *cooling regimen.* In these cases the more drastic purgatives are to be avoided, as

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their use would be attended with so much stimulating effect on the system in general, as to counterbalance the advantage we should derive from their diminishing the mass of fluids. Again, the change in the distribution of the blood from other parts of the system to the bowels, is another circumstance attending the use of purgatives, which renders them of considerable importance in several diseases. It seems to follow, that if an evacuation be made from one set of vessels, the afflux of fluids to these will be increased in order to supply it, and, consequently, the afflux to other parts of the system will be diminished. Upon this principle, Dr Cullen explains the utility of purgatives in disorders of the head, which originate from over-fulness or over-activity, and in mental affections, mania, phrensy, headach, &c. The afflux of fluids in the vessels of the abdomen, which supply the intestines, being increased by purging, the afflux will be proportionally diminished in the vessels which carry blood to the head, and both the quantity and impetus of the blood in the head will thus be lessened.

The good effects of cathartics in the small pox, and some other inflammatory affections of the skin, are probably to be attributed chiefly to their removing local irritation, and producing a considerable depletion, and thus diminishing the general fever that usually attends those diseases.

When the contents of the bowels are morbidly retained, either in consequence of their peristaltic motion being unusually slow from a torpid state of the muscular fibres, or from a relaxed state of the bowels, favouring an accumulation of fæces, from a deficiency of bile, or from habitual neglect, the use of cathartics is indicated, to prevent more serious complaints that may be the consequence of this costiveness. The kind of cathartics to be employed depends on the nature of the cause producing the constipation, or particular circumstances attending it. If, for example, the costiveness be attended with a debilitated habit, with symptoms of great nervous mobility, flatulence, or other signs of a debilitated state of the alimentary canal, some of the warmer aromatic cathartics will be proper, as aloes, rhubarb, or such preparations of these as contain an aromatic in their composition. If the costiveness seems to arise from a deficiency of bile, the aloetic and mercurial purgatives are indicated.

In cases where the costiveness has arisen from some accidental cause, as in colic, dysentery, enteritis, it will be necessary to vary the cathartics according to the nature of the affection, or the cause by which it has been produced. See COLIC, DYSENTERY, and ENTERITIS, MEDICINE *Index*.

Cathartics exert a particular action on the absorbent vessels, by which these are enabled to take up a greater quantity of fluid than in their natural state. Hence the use of drastic purgatives in dropsy. The action of cathartics in this way does not appear to be well understood. Dr Cullen, treating of this subject, observes that, as in every cavity of the body there is an inhalation and exhalation constantly going on, it is presumed that there is some balance constantly preserved between the secretory and absorbent powers; so that if the former are increased, the latter will be also; and, therefore, that when the secretions are, upon occasion, much increased, the action of the absorbents may be particularly excited. This explains, why purging often excites the *action* of the *absorbents*, to take up more copiously the fluids that were otherwise stagnant in the adipose membrane, or other cavities of the body, and thereby often proves a cure of dropsy. This explanation is perhaps little more than an implicit statement of the fact. It is certain, however, that *ascites*, or dropsy of the abdomen, has been often affected by means of acrid drastic purgatives, such as gamboge, scammony, &c. when diuretic remedies have failed. But it is obvious that these remedies can only be administered to those who retain considerable strength of constitution, debilitated neither by inveterate intemperance, old age, nor a long disease.

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The attention of practitioners has been lately particularly directed to the use of purgatives in several diseases, in which they were formerly either not employed at all, or not used to any extent, in consequence of a valuable publication by Dr James Hamilton, senior physician of the Edinburgh infirmary. Dr Hamilton having observed that in several spasmodic diseases, especially in chorea, or St Vitus's dance, there was commonly a considerable collection of black offensive fæces in the bowels, was led to conceive that this must prove a very powerful irritating cause in protracting these diseases; and as, in common with other practitioners, he had experienced great want of success from the usual administration of tonic medicines in these affections, he was led to try the effect of purgatives given to such an extent as to produce complete evacuation of the bowels. The plan succeeded entirely to his satisfaction, and by this treatment he finds chorea is speedily cured, generally in 10 days or a fortnight. Besides chorea, Dr Hamilton has been very successful in the administration of purgatives in cases of typhus, scarlatina, fever, marasmus, chlorosis, hematesmus, hysteria, tetanus, and several other chronic affections. He was originally induced to pursue his new method of treating typhus, by observing that the antimonials, which were formerly so largely employed in this disease, appeared to be most serviceable when they operated upon the bowels. This led him to suspect, that any purgative medicine might be substituted in their place, and that the debilitating effect of vomiting and sweating might thus be avoided. Experience has fully confirmed these conjectures, and after a trial of some years he is thoroughly persuaded, that the full and regular evacuation of the bowels relieves the oppression of the stomach, and mitigates the other symptoms of fever. He has accordingly almost entirely given up the administration of other remedies, and trusts to the exhibition of frequent and copious purgatives. It might have been apprehended, that this plan of treatment would have aggravated the debility, which constitutes a striking symptom of typhus; but ample experience has proved that this is not the case. The purgatives which Dr Hamilton * has employed in fever are calomel, calomel and jalap, jalap and crystals of tartar, aloes, solutions of mild neutral salts, infusion of senna, and sometimes the two last medicines conjoined.

* *See Hamilton on Purgative Medicines.*

Cathartics are among the most efficacious remedies that are employed with a view to promote or restore the menstrual evacuation; and accordingly they form the chief part of those remedies that are commonly call-

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ed emmenagogues. With this view the drastic purgatives are chiefly given, as aloes, bryony, black hellebore, and some of the preparations of mercury.

There is another use of cathartics that may be referred to a mechanical operation, viz. their expelling worms from the bowels. See ANTHELMINTICS.

CLASS VI. ERRHINES.

158 Definition of errhines.

Those medicines are termed errhines that are employed to promote an increased discharge of mucus from the nostrils. The principal errhines are the following.

159 Table of errhines.

I. VEGETABLE PRODUCTS.

Asarum europæum, *asarabacca.*
Pulvis asari europæi compositus, *compound powder of asarabacca.*
Cephalic snuff.
Nicotiana tabacum, *tobacco.*
The ordinary snuffs.
Iris florentina, *Florentine orris.*
Lavandula spica, *lavender flowers.*
Origanum majorana, *sweet marjoram.*
Rosmarinus officinalis, *rosemary.*
Teucrium marum, *mastich.*
Veratrum album, *white hellebore.*

II. MINERAL PRODUCTS.

Hydrargyrum, *mercury.*
Subsulphas hydrargyri flavus, *yellow subsulphate of mercury*, or *turbeth mineral.*

160 Effects and uses of errhines.

The evacuation produced by the action of errhines is sometimes procured without any sneezing, but frequently attended with it. This, however, implies no difference, but merely that of stronger or weaker stimulus in the medicine employed. The sneezing that occurs may have particular effects by the concussion it occasions; but it does not vary the evacuation induced by the medicine, excepting that with sneezing there is commonly a larger evacuation produced.

This evacuation often goes no further than to restore the natural evacuation when interrupted; but it commonly goes farther, and increases the evacuation beyond its usual measure; and that not only for some time after the medicine has been applied, but also for some following days.

This evacuation not only empties, but also produces a larger excretion from the mucous follicles of the schneiderian membrane; but, agreeably to the laws of the circulation, this must produce an afflux of fluids from the neighbouring vessels, and in some measure empty these. By this it often removes rheumatic congestions in the neighbouring vessels, and particularly those in which the toothach often consists.

But not only the more nearly adjoining vessels are thus relieved, but the effect may extend further to the whole of the branches of the external carotid; and we have known instances of headachs, pains of the ear, and ophthalmias, cured or relieved by the use of errhines. How far their effects may extend, cannot be exactly determined; but it is probable that they may operate more or less on the whole vessels of the head, as even a branch of the internal carotid passes into the nose; and independent of this, it is not improbable that our errhines may have been of use in preventing apoplexy and palsy; which at least is to be attended to so far, that whenever any approach to these diseases is suspected, the drying up of the mucous discharge should be attended to, and if possible restored.*

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* *Cullen's Materia Medica*, vol. ii. p. 35.

CLASS VII. SIALAGOGUES.

161 Definition of sialagogues.

These are employed either to promote an increased flow of saliva, or to produce such an action on the gums, as shall indicate their having been received in sufficient quantity into the circulation. Under the former division are ranked several vegetable substances; under the latter are included only mercury and its preparations.

162 Table of sialagogues.

I. VEGETABLE PRODUCTS.

Daphne mezereum, *mezereum.*
Amomum zinziber, *ginger.*
Anthemis pyrethrum, *pellitory of Spain.*
Pistacia lentiscus, *mastich.*

II. MINERAL PRODUCTS.

Hydrargyrum, *mercury.*
Hydrargyrum purificatum, *purified mercury.*
Submurias hydrargyri, *submuriate of mercury.*
Murias hydrargyri, *muriate of mercury.*
Submurias hydrargyri præcipitatus, *precipitated submuriate.*
Pilulæ hydrargyræ, *mercurial pills.*
Oxidum hydrargyri cinereum, *cinereous oxide of mercury.*
Unguentum hydrargyrum, *mercurial ointment.*
Hydrargyrus calcinatus, *red oxide of mercury.*
Acetis hydrargyri, *acetate of mercury.*
Hydrargyrus sulphuratus ruber, *red sulphuret of mercury.*
Sulphuretum hydrargyri nigrum, *black sulphuret of mercury.*

163 Uses of sialagogues.

The vegetable sialagogues are commonly called masticatories, because they produce their effect by being chewed in the mouth. They are employed in similar cases with the errhines, more especially in toothach. The use of the mercurial sialagogues will be explained hereafter in our account of mercury.

CLASS VIII. EMOLLIENTS.

164 Definition of emollients.

The medicines commonly called emollients consist either of diluting liquors, formed of simple water, or certain vegetable infusions, or mucilaginous and oily matters that have the mechanical property of defending the parts to which they are applied, from the action of acrimonious substances that pass over them; or of softening and relaxing the skin and other external parts. The first of these are commonly called *diluents*, the second *demulcents*, and the third simply *emollients*. We shall enumerate them together under the general term of emollients, reserving an account of their particular uses for the individual articles.

I. ANIMAL PRODUCTS.

165 Table of emollients.

Acipenser huso, sturio, &c. *isinglass.*
Ovis aries, *mutton suet.*
Physeter macrocephalus, *spermaceti.*
Sus scrofa, *hogs-lard.*

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Linimentum simplex, *simple liniment.*
Unguentum simplex, *simple ointment.*
Unguentum adipis suillæ, *ointment of hog's-lard.*
Unguentum spermatis ceti, *spermaceti ointment.*
Unguentum ceræ, *wax ointment.*
Ceratum simplex, *simple cerate.*
Ceratum spermatis ceti, *spermaceti cerate.*

II. Vegetable Products.

Cera alba et flava, *white and yellow wax.*
Olea Europæa.
Althea officinalis, *marshmallow.*
Decoctum altheæ officinalis, *decoction of marshmallow.*
Syrupus altheæ, *syrup of marshmallow.*
Amygdalus communis, *almonds* and *oil of almonds.*
Emulsio amygdali communis, *almond emulsion.*
Oleum amygdali communis, *oil of almonds.*
Astragalus tragacantha, *gum tragacanth.*
Mucilago astragali tragacanthi, *mucilage of tragacanth.*
Pulvis tragacanthi compositus, *compound powder of tragacanth.*
Avena sativa, *oat meal.*
Cocos butyracea, *palm oil.*
Eryngium maritimum, *eryngo root.*
Glycyrrhiza glabra, *liquorice root, and extract.*
Trochisci glycyrrhizæ, *liquorice lozenges.*
Hordeum distichon, *barley.*
Decoctum hordei distichi, *barley water.*
Decoctum hordei compositum, *compound decoction of barley.*
Lilium candidum, *white lily root.*
Linum usitatissimum, *lintseed.*
Oleum lini usitatissimi, *liutseed oil.*
Malva sylvestris, *common mallow.*
Decoctum pro enemate, *decoction for clysters.*
Melissa officinalis, *balm.*
Mimosa nilotica, *gum arabic.*
Mucilago mimosæ niloticæ, *mucilage of gum arabic.*
Emulsio mimosæ niloticæ, *common emulsion.*
Trochisci gummosi, *gum lozenges.*
Penæa sarcocolla, *sarcocolla.*
Pyrus cydonia, *quince seed.*
Mucilago seminis cydonii mali, *mucilage of quince seed.*
Triticum hibernum, *wheat and starch.*
Mucilago amyli, *mucilage of starch.*
Trochisci amyli, *starch lozenges.*
Vitis vinifera, *raisins.*

166 Uses of emollients.

Diluents are chiefly employed to abate thirst in fever and inflammatory affections, or to promote the action of other remedies, particularly diaphoretics and diuretics. Demulcents are chiefly used in catarrh, pneumonia, dysentery, diarrhœa, gonorrhœa; and external emollients are employed chiefly in case of sprains and bruises, or to defend the surface of ulcers from the dressings and bandages.

Class IX. REFRIGERANTS.

167 Definition of refrigerants.

Under this term are comprehended those remedies which are employed with a view to diminish the preternaturally increased heat that takes place in the body during fevers and several inflammatory affections.

The following are the principal refrigerants enumerated by the various writers on the materia medica. Therapeutics.

168 Table of refrigerants.

I. Vegetable Products.

Acidum acetosum, *acetous acid.*
Acetis potassæ, *acetate of potash.*
Aqua acetitis ammoniæ, *water of acetate of ammonia.*
Supertartras potassæ, *supertartrate of potash.*
Tamarindus indica, *tamarinds.*
Berberis vulgaris, *barberry.*
Citrus medica, *lemon.*
Syrupus citri medicæ, *syrup of lemon juice.*
Citrus aurantia, *orange.*
Cochlearia officinalis, *scurvy grass.*
Succus cochleariæ compositus, *compound juice of scurvy-grass.*
Morus nigra, *mulberry.*
Syrupus fructus mori, *syrup of mulberry juice.*
Oxalis acetosella, *wood sorrel.*
Conserva acetosellæ, *conserve of sorrel.*
Ribes nigrum, *black currants.*
Succus spissatus ribis nigri, *inspissated juice of black currants.*
Syrupus succi ribis nigri, *syrup of black currant juice.*
Ribes rubrum, *red currants.*
Rosa canina, *dog rose* or *hips.*
Conserva rosæ caninæ, *conserve of hips.*
Rubus idæus, *raspberry.*
Syrupus fructus rubi idæi, *syrup of raspberry juice.*
Rumex acetosa, *common sorrel.*
Veronica beccabunga, *brooklime.*

II. Mineral Products.

Sulphas zinci, *sulphate of zinc.*
Nitras potassæ, *nitrate of potash.*
Acidum nitrosum, *nitrous acid.*
Spiritus ætheris nitrosi, *spirit of nitrous ether.*
Trochisci nitratis potassæ, *nitre lozenges.*
Murias sodæ, *muriate of soda.*
Acidum muriaticum, *muriatic acid.*
Acidum sulphuricum, *sulphuric acid.*
Acidum sulphuricum dilutum, *diluted sulphuric acid.*
Plumbum, *lead.*
Superacetas plumbi, *superacetate* or *sugar of lead.*
Aqua lithargyri acetati, *water of acetated litharge,* or *Goulard's extract.*
Aqua lithargyri acetati composita, *compound water of acetated litharge.*
Unguentum acetitis plumbi, *ointment of acetate of lead.*
Ceratum lithargyri acetati compositum, *compound cerate of acetated litharge.*
Affusion of cold water.

169 Effects and uses of refrigerants.

Refrigerants appear to act chemically, but in what precise manner they diminish the heat of the human body, is not well understood. On this subject Mr Murray expresses himself in the following manner.

"Keeping in view the very inconsiderable action of those remedies, it may perhaps be possible from the consideration of the mode in which animal temperature

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is generated, to point out how their trivial refrigerant effects may be produced.

"It has been sufficiently established, that the consumption of oxygen in the lungs is materially influenced by the nature of the ingesta received into the stomach; that it is increased by animal food and spirituous liquors, and in general by whatever substances contain a small quantity of oxygen in their composition. But the temperature of animals is derived from the consumption of oxygen by respiration. An increase of that must occasion a great evolution of caloric in the system, and increase of temperature, while a diminution in the consumption of oxygen must have an opposite effect. If, therefore, when the temperature of the body is morbidly increased, substances be introduced into the stomach containing a large proportion of oxygen, especially in a state of loose combination, and capable of being assimilated by the digestive powers, the nutritious matter received into the blood must contain a larger portion of oxygen than usual; less of that principle will be consumed in the lungs, by which means less caloric being evolved, the temperature of the body must be reduced; and this operating as a reduction of stimulus, will diminish the number and force of the contractions of the heart.

"It might be supposed that any effect of this kind must be trivial, and it actually is so. It is, as Cullen has remarked, not very evident to our senses, nor easily subjected to experiment, and is found only in consequence of frequent repetitions *."

*Murray's Elements.

Refrigerants are considered by Mr Murray as acting chemically, but we are not certain how far his opinion is correct. That some of them do operate in cooling the human body, merely as chemical agents, cannot be denied; but several seem to produce this effect by some particular action on the nervous system, that is not well understood.

Class X. ASTRINGENTS.

170 Definition of astringents.

Astringents are defined by Dr Cullen to be such substances as when applied to the human body produce a condensation and contraction of the soft solids, and thereby increase their density and force of cohesion. If they are applied to longitudinal fibres, the contraction is made in the length of these; but if applied to circular fibres, the diameters of the vessels, or the cavities which these surround, are diminished.

The principal substances that act in this way are taken from vegetables, and consist of the barks of several trees, certain roots and inspissated juices; but a few of them are derived from minerals, especially the stronger mineral acids, a few metallic and earthy salts, and, according to some writers, alcohol. We shall enumerate the following.

171 Table of astringents.

I. Vegetable Products.

Hæmatoxylum campechianum, *logwood.*
Extractum ligni hæmatoxyli campechiani, *extract of logwood.*
Juglans regia, *walnut.*
Eucalyptus resinifera, *kino.*
Tinctura kino, *tincture of kino.*
Mimosa catechu, *catechu*, or *Japan earth.*
Infusum mimosæ catechu, *infusion of catechu.*
Tinctura mimosæ catechu, *tincture of catechu.*
Electuarium catechu, *electuary of catechu.*
Polygonum bistorta, *bistort.*
Potentilla reptans, *potentilla.*
Prunus spinosa, *sloe.*
Conserva pruni sylvestris, *conserve of sloes.*
Pterocarpus draco, *dragon's blood.*
Punica granatum, *pomegranate, balaustines.*
Quercus cerris, *gall nut.*
Quercus robur, *common oak.*
Rosa gallica, *red rose.*
Infusum rosæ gallicæ, *infusion of roses.*
Conserva rosæ gallicæ, *conserve of red roses.*
Syrupus rosæ gallicæ, *syrup of red roses.*
Mel rosæ, *honey of roses.*
Tormentilla erecta, *tormentil root.*
Vitis vinifera, *red Port wine.*

II. Mineral Products.

Acidum sulphuricum, *sulphuric acid.*
Acidum muriaticum, *muriatic acid.*
Ferrum, *iron.*
Tinctura muriatis ferri, *tincture of muriated iron.*
Plumbum, *lead.*
Superacetas plumbi, *superacetate of lead.*
Sulphas cupri, *sulphate of copper.*
Solutio sulphatis cupri, *solution of sulphate of copper.*
Liquor cupri ammoniati, *liquor of ammoniated copper.*
Sulphas zinci, *sulphate of zinc.*
Aqua zinci vitriolati cum camphora, *water of vitriolated zinc with camphor.*
Solutio acetitis zinci, *solution of acetate of zinc.*
Supersulphas aluminæ et potassæ, *supersulphate of alumina and potash*, or *alum.*
Sulphas aluminæ exsiccatus, *dried sulphate of alumina.*
Pulvis sulphatis aluminæ compositus, *compound powder of sulphate of alumina.*
Aqua aluminis composita, *compound alum water.*
Cataplasma aluminis, *cataplasm of alum.*

It is of some consequence that the precise meaning of the term astringent, used as a medicine, should be understood.

172 Nature of astringents.

The usual method of detecting astringency is, by the corrugating of the tongue, and the peculiar rough and harsh sensation communicated to the palate by the touch of an astringent substance; and in general, all bodies may be called astringents, that have the property of communicating these sensations. Most of the vegetable astringents have besides the property of striking a black colour when mixed with a solution of sulphate of iron, and this property has been constantly considered as one of the surest tests of astringency in vegetable substances. Now modern chemistry has shewn, that this property is owing to a peculiar acid, viz. the gallic, and not to tannin or the astringent principle properly so called. It so happens that in most vegetable astringents the gallic acid and tannin are found united; but in a few, especially catechu, the astringent principle exists without the gallic acid, and consequently no black colour is produced when a solution of catechu is mixed with a solution of iron. Hence the pharmaceutic chemist should

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be aware that the above property is not a sure test of vegetable astringency. A more certain chemical test is animal jelly; for, when a solution of this is added to a solution of vegetable astringent, a copious precipitate is produced, which in fact is leather.

Astringents appear to act nearly in a similar manner on the dead animal fibre as on the living solid, in both cases thickening and hardening: when applied to the living solid, they produce increase of tone and strength, restrain inordinate actions, and check excessive discharges from any of the vessels or cavities; and to the dead fibre occasion density, toughness, imperviousness to water in a greater or less degree, and insusceptibility to the common causes of putrefaction. See TANNING.

173 Effects and uses. Astringents are largely employed in medicine, and their use is attended with considerable advantage. The cases in which they are most beneficial, and in which their effect seems most unequivocally owing to the astringent principle, are diarrhœas, leucorhœa, and gleets. They have also been employed with success for restraining profuse evacuations where they could not be immediately applied to the affected part, as in the above cases; for example, in hemoptysis and epistaxis; but here their operation seems to be less attributable to their astringency than to their tonic power.

Such astringents as are employed externally to check hemorrhage from divided vessels, are usually called styptics.

CLASS IX. TONICS.

174 Definition of tonics. Tonics are those medicines which are suited to counteract debility, or to give strength and energy to the moving fibres. They are taken partly from vegetables, and partly from minerals.

175 Table of tonics.

I. VEGETABLE PRODUCTS.

Anthemis nobilis, *chamomile flowers.*
Centaurea benedicta, *holy thistle.*
Marrubium vulgare, *horchound.*
Myrrha, *myrrh.*
Pulvis myrrhæ compositus, *compound powder of myrrh.*
Dorstenia contrayerva, *contrayerva.*
Pulvis contrayervæ compositus, *compound powder of contrayerva.*
Vitis vinifera.
Vinum rubrum lusitanum, *red port wine.*
Æsculus hippocastanum, *horse-chesnut bark.*
Angustura, *angustura bark.*
Chironea centaureum, *lesser centaury.*
Cinchona officinalis, *Peruvian bark.*
Infusum cinchonæ officinalis, *infusion of cinchona.*
Decoctum cinchonæ officinalis, *decoction of cinchona.*
Tinctura cinchonæ officinalis, *tincture of cinchona.*
Tinctura cinchonæ composita, *compound tincture of cinchona.*
Tinctura cinchonæ ammoniata, *ammoniated tincture of cinchona.*
Extractum cinchonæ officinalis, *extract of cinchona.*
Cinchona caribæa, *Caribean cinchona.*
Colomba, *colomba root.*
Tinctura colombæ, *tincture of colomba.*
Croton eleutheria, *cascarilla bark.*
Tinctura cascarillæ, *tincture of cascarilla.*
Extractum cascarillæ, *extract of cascarilla.*
Gentiana lutea, *gentian root.*
Infusum gentianæ compositum, *compound infusion of gentian.*
Tinctura gentianæ composita, *compound tincture of gentian.*
Vinum gentianæ compositum, *compound wine of gentian.*
Extractum gentianæ, *extract of gentian.*
Menyanthes trifoliata, *marsh trefoil.*
Quassia excelsa, *quassia.*
Quassia simaruba, *simarouba.*
Salix fragilis, *fragile willow bark.*
Salix alba, *white willow bark.*
Swietenia mahagoni, *mahogany tree bark.*
Swietenia febrifuga, *febrifuge swietenia.*
Tanacetum vulgare, *common tansey.*

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II. MINERAL PRODUCTS.

Sulphas cupri, *sulphate of copper.*
Ammoniaretum cupri, *ammoniaret of copper.*
Pilulæ ammoniarcti cupri, *pills of ammoniaret of copper.*
Zincum, *zinc.*
Sulphas zinci, *sulphate of zinc.*
Solutio sulphatis zinci, *solution of sulphate of zinc.*
Oxidum zinci, *oxide* or *flowers of zinc.*
Nitras potassæ, *nitrate of potash.*
Acidum nitrosum, *nitrous acid.*
Ferrum, *iron.*
Carbonas ferri, *carbonate of iron.*
Carbonas ferri præcipitatus, *precipitated carbonate of iron.*
Aqua ferri aërati, *water of acrated iron.*
Sulphas ferri, *sulphate of iron.*
Vinum ferri, *wine of iron.*
Tinctura muriatis ferri, *tincture of muriate of iron.*
Sulphas ferri exsiccatus, *dried sulphate of iron.*
Oxidum ferri rubrum, *red oxide of iron.*
Emplastrum oxidi ferri rubri, *plaster of red oxide of iron.*
Ferri limaturæ purificatæ, *purified filings of iron.*
Oxidum ferri nigrum purificatum, *purified black oxide of iron.*
Murias ammoniæ et ferri, *muriate of ammonia and iron.*
Tinctura ferri ammoniacalis, *tincture of ammoniacal iron.*
Tartras ferri et potassæ, *tartrate of iron and potash.*
Tinctura ferri acetati, *tincture of acetated iron.*
Acidum sulphuricum, *sulphuric acid.*
Acidum sulphuricum dilutum, *diluted sulphuric acid.*

Acidum

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Acidum sulphuricum aromaticum, *aromatic sulphuric acid.*
Argentum, *silver.*
Nitras argenti, *nitrate of silver*, or *lunar caustic.*
Arsenicum, *arsenic.*
Carbonas barytæ, *carbonate of baryta.*
Carbonas calcis, *carbonate of lime* or *chalk.*
Solutio muriatis calcis, *solution of muriate of lime.*
Sulphas barytæ, *sulphate of baryta.*
Murias barytæ, *muriate of baryta.*
Solutio muriatis barytæ, *solution of muriate of baryta.*
Aquæ minerales ferrum continentes, *chalybeate mineral waters.*

III. Gaseous Products.

Gas oxigenium, *oxygen gas.*
Balneum frigidum, *cold bath.*

Equitatio, *riding on horseback.*

176 Effects and uses of tonics.

Most tonics act immediately on the stomach, and hence on the system at large. They increase the appetite, quicken digestion, and add vigour to the body. Hence they are useful in most cases of debility; but when used improperly or for too long a time, they predispose to apoplectic and paralytic disorders.

Class XII. STIMULANTS.

177 Definition and effects of stimulants.

Most of the articles of the Materia Medica might, in an extended sense, be called *stimulants;* but this term is, by the general consent of physicians, restrictively applied to those medicines which possess the power of sustaining or increasing the vital energies—of raising and invigorating the action of the heart and arteries—and of restoring to the musuclar fibre, when affected with torpor, its lost sensibility and power of motion. Hence the use, under proper regulations, of the various articles belonging to this class in cases of gout, palsy, and malignant typhoid fever: but let it be repeated, under proper regulations; for we cannot but remark that medicines which give additional activity to the circulation, and which augment the heat and sensibility of the system throughout, are often abusively employed, being administered too early, as well as too freely in the above-mentioned and some other similar disorders. In the beginning of typhus fever, in particular, it cannot be doubted that a hasty and lavish exhibition of such medicines has, in numerous instances, aggravated every symptom, and brought the patient, who would otherwise have had the disease in its mildest form, into considerable danger *.

* *Synopsis of Materia Medica*, vol. ii. p. 154.

The class of stimulants is exceedingly numerous, and might, perhaps, with advantage, be subdivided into sections; but as this subdivision would admit of much dispute from the different acceptation of the term *stimulant*, we shall here only give a table of stimulants distributed as usual, into animal, vegetable, and mineral products.

I. Animal Products.

178 Table of stimulants.

Murias ammoniæ, *muriate of ammonia.*
Aqua ammoniæ, *water of ammonia.*
Alcohol ammoniatum, *ammoniated alcohol.*
Carbonas ammoniæ, *carbonate of ammonia.*
Aqua carbonatis ammoniæ, *water of carbonate of ammonia.*
Oleum ammoniatum, *ammoniated oil.*
Linimentum ammoniæ, *liniment of ammonia.*
Linimentum volatile, *volatile liniment.*
Alcohol ammoniatum aromaticum, *aromatic ammoniated alcohol.*
Spiritus ammoniæ succinatus, *succinated spirit of ammonia.*
Moschus moschiferus, *musk.*
Mistura moschata, *musk mixture.*
Cervus elaphus, *hartshorn.*
Liquor volatilis cornu cervi, *volatile liquor of hartshorn.*
Sal cornu cervi, *salt of hartshorn.*
Lytta vesicatoria, *cantharides.*
Tinctura melocs vesicatorii, *tincture of cantharides.*
Unguentum infusi meloes vesicatorii, *ointment of infusion of cantharides.*
Unguentum pulveris meloes vesicatorii, *ointment of powder of cantharides.*
Ceratum cantharidis, *cerate of cantharides.*
Emplastrum meloes vesicatorii, *plaster of cantharides.*

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II. Vegetable Products.

Sinapis alba, *mustard seed.*
Cataplasma sinapios, *mustard cataplasm.*
Allium sativum, *garlic.*
Arum maculatum, *wake-robin.*
Conserva ari, *conserve of arum.*
Pimpinella anisum, *anise seed.*
Oleum volatile pimpinellæ anisi, *volatile oil of anise seed.*
Styrax benzoin, *benjamin.*
Acidum benzoicum, *benzoic acid.*
Tinctura benzoes composita, *compound tincture of benjamin.*
Alcohol.
Æther sulphuricus, *sulphuric æther.*
Æther sulphuricus cum alcohole, *sulphuric æther with alcohol.*
Æther sulphuricus cum alcohole compositus, *compound sulphuric æther with alcohol.*
Oleum vini, *oil of wine.*
Acidum acetosum, *vinegar.*
Acidum acetosum forté, *strong acetous acid.*
Acidum acetosum camphoratum, *camphorated acetous acid.*
Acetum aromaticum, *aromatic vinegar.*
Aristolochia serpentaria, *snake-root.*
Tinctura aristolochiæ serpentariæ, *tincture of snake root.*
Daphne mezereum, *mezereum.*
Decoctum daphnes mezerei, *decoction of mezereum.*
Guaiacum officinale, *guaiacum.*
Decoctum guaiaci officinalis, *decoction of guaiacum.*
Tinctura guaiaci officinalis, *tincture of guaiacum.*
Tinctura guaiaci ammoniata, *ammoniated tincture of guaiacum.*
Papaver somniferum, *opium in small doses.*

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Tinctura opii, *tincture of opium.*

Tinctura opii camphorata, *camphorated tincture of opium.*

Tinctura opii ammoniata, *ammoniated tincture of opium.*

Confectio opiata, *opiate confection.*

Cochlearia armoracia, *horse radish.*

Copaifera officinalis, *balsam of copaiba.*

Pinus sylvestris, Pinus larix, } *turpentine and rosin.*

Oleum volatile pini purissimum, *purified oil of turpentine.*

Unguentum resini flavi, *ointment of yellow rosin.*

Ceratum resini flavi, *cerate of yellow rosin.*

Emplastrum ceræ, *wax plaster.*

Unguentum picis, *pitch plaster.*

Unguentum picis burgundicæ, *ointment of burgundy pitch.*

Arnica montana, *leopard's bane.*

Bubon galbanum, *galbanum.*

Pilulæ galbani compositæ, *compound pills of galbanum.*

Emplastrum galbani compositum, *compound plaster of galbanum.*

Juniperus sabina, *savine.*

Oleum juniperi sabinæ, *oil of savine.*

Juniperus Lycia, *olibanum.*

Pastinaca opoponax, *opoponax.*

Veratrum album, *white hellebore.*

Unguentum hellebori albi, *ointment of white hellebore.*

Decoctum hellebori albi, *decoction of white hellebore.*

Acorus calamus, *calamus aromaticus*, or *sweet flag*

Amomum zingiber, *ginger.*

Syrupus amomi zingiberis, *syrup of ginger.*

Tinctura amomi zingiberis, *tincture of ginger.*

Amomum repens, *lesser cardamom seeds.*

Tinctura amomi repentis, *tincture of cardamom.*

Tinctura cardamomi composita, *compound tincture of cardamom.*

Amyris gileadensis, *balm of gilead.*

Amyris elemifera, *gum elemi.*

Unguentum elemi, *elemi ointment.*

Anethum fœniculum, *sweet fennel seed.*

Oleum volatile fœniculi dulcis, *oil of fennel.*

Aqua fœniculi dulcis, *fennel water.*

Anethum graveolens, *dill seed.*

Aqua anethi, *dill water.*

Angelica archangelica, *angelica.*

Apium petroselinum, *parsley root and seed.*

Arbutus uva ursi, *whortle berry.*

Artemisia maritima, *sea wormwood.*

Conserva absinthii maritimi, *conserve of sea wormwood.*

Decoctum pro fomento, *decoction for fomentation.*

Canella alba, *white canella.*

Capsicum annuum, *capsicum, Cayenne pepper.*

Carum carvi, *caraway seeds.*

Oleum carvi, *oil of caraway.*

Spiritus cari carvi, *spirit of caraway.*

Cistus creticus, *ladanum.*

Emplastrum ladani, *ladanum plaster.*

Citrus aurantium, *Seville orange-peel.*

Oleum volatile citri aurantii, *essence of orange-peel.*

Aqua citri aurantii, *orange-peel water.*

Tinctura aurantii corticis, *tincture of orange-peel.*

Syrupus citri aurantii, *syrup of orange-peel.*

Conserva citri aurantii, *conserve of orange-peel.*

Coriandrum sativum, *coriander seed.*

Crocus sativum, *saffron.*

Syrupus croci, *syrup of saffron.*

Tinctura croci, *tincture of saffron.*

Cuminum cyminum, *cummin seed.*

Cataplasma cumini, *cummin cataplasm.*

Emplastrum cumini, *cummin plaster.*

Curcuma longa, *turmeric.*

Daucus carota, *wild carrot seed, carrot root.*

Dianthus caryophyllus, *clove Julyflower.*

Syrupus caryophylli rubri, *syrup of cloves.*

Eugenia caryophyllata, *cloves.*

Oleum volatile caryophylli aromatici, *oil of cloves.*

Hypericum perforatum, *St John's wort.*

Inula helenium, *elecampane root.*

Kœmpferia rotunda, *zedoary.*

Lavandula spica, *lavender flowers.*

Oleum volatile lavandulæ spicæ, *oil of lavender.*

Spiritus lavandulæ spicæ, *spirit of lavender.*

Spiritus lavandulæ compositus, *compound spirit of lavender.*

Laurus cinnamomum, *cinnamon.*

Oleum volatile lauri cinnamomi, *oil of cinnamon.*

Aqua lauri cinnamomi, *cinnamon water.*

Spiritus lauri cinnamomi, *spirit of cinnamon.*

Tinctura lauri cinnamomi, *tincture of cinnamon.*

Tinctura cinnamomi composita, *compound tincture of cinnamon.*

Pulvis aromaticus, *aromatic powder.*

Electuarium aromaticum, *aromatic electuary.*

Laurus cassia, *cassia bark.*

Aqua lauri cassiæ, *cassia water.*

Laurus nobilis, *bay tree.*

Lobelia syphilitica, *blue cardinal flower.*

Melaleuca leucadendron, *cajeput oil.*

Mentha viridis, *spearmint.*

Oleum menthæ sativæ, *oil of mint.*

Aqua menthæ sativæ, *mint water.*

Spiritus menthæ sativæ, *spirit of mint.*

Mentha piperita, *peppermint.*

Oleum volatile menthæ piperitæ, *oil of peppermint.*

Aqua menthæ piperitæ, *peppermint water.*

Spiritus menthæ piperitæ, *spirit of peppermint.*

Mentha pulegium, *pennyroyal.*

Oleum volatile menthæ pulegii, *oil of pennyroyal.*

Aqua menthæ pulegii, *pennyroyal water.*

Spiritus menthæ pulegii, *spirit of pennyroyal.*

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Myristica moschata, *nutmeg.*
Spiritus myristicæ moschatæ, *spirit of nutmeg.*
Myroxylou Peruiferum, *balsam of Peru.*
Tinctura balsami Peruviani, *tincture of balsam of Peru.*
Myrtus pimenta, *pimento*, or *Jamaica pepper.*
Oleum volatile myrti pimentæ, *oil of pimento.*
Aqua myrti pimentæ, *pimento water.*
Spiritus myrti pimentæ, *spirit of pimento.*
Origanum vulgare, *origanum.*
Oleum origani, *oil of origanum.*
Panax quinquefolium, *ginseng.*
Parietaria officinalis, *pellitory of the wall.*
Pinus balsamea, *balsam of Canada.*
Piper nigrum, *black pepper.*
Piper cubeba, *cubebs.*
Piper longum, *long pepper.*
Pistacia terebinthus, *Chio turpentine.*
Rhus toxicodendron, *poison oak.*
Styrax officinale, *storax.*
Styrax purificata, *strained storax.*
Toluifera balsamum, *balsam of Tolu.*
Tinctura toluiferæ balsami, *tincture of balsam of Tolu.*
Syrupus toluiferæ balsami, *syrup of balsam of Tolu.*
Trigonella fœnum græcum, *fœnugreek seed.*
Urtica dioica, *stinging nettle.*
Wintera aromatica, *winter's bark.*

III. Mineral Products.

Hydrargyrum, *mercury.*
Unguentum oxidi hydrargyri rubri, *ointment of red oxide of mercury.*
Unguentum nitratis hydrargyri, *ointment of nitrate of mercury.*
Unguentum nitratis hydrargyri mitius, *milder ointment of nitrate of mercury.*
Nitras potassæ, *nitrate of potash.*
Acidum nitrosum, *nitrous acid.*
Acidum nitricum, *nitric acid.*
Unguentum acidi nitrosi, *ointment of nitrous acid.*
Sapo Hispanus, *Castile soap.*
Tinctura saponis, *tincture of soap.*
Tinctura saponis et opii, *tincture of soap and opium.*
Ceratum saponis, *soap cerate.*
Emplastrum saponis, *soap plaster.*
Murias sodæ, *muriate of soda.*
Murias sodæ exsiccatus, *dried muriate of soda.*
Acidum sulphuricum, *sulphuric acid.*
Acidum arseniosum, *arsenious acid.*
Bitumen petroleum, *petroleum.*
Oleum petrolei, *oil of petroleum.*
Subboras sodæ, *subborate of soda*, or *borax.*
Subacetas cupri, *subacetate of copper*, or *verdigrise.*
Oxymel æruginis, *oxymel of verdigrise.*
Unguentum acetitis cupri, *ointment of subacetate of copper.*
Calx, *quicklime.*
Linimentum aquæ calcis, *liniment of lime water.*

IV. Gaseous Products.

Gas oxygenium, *oxygen gas.*
Gas oxidum azotii, *gaseous oxide of azote.*
Electrisatio et galvanisatio, *electricity and galvanism.*

Balneum calidum, *the hot bath.*

The substances enumerated in the above table have been variously denominated, according to their real or supposed medical virtues. Of the internal stimulants, most have been called cordials, from the effect they have in raising the spirits; some have been termed carminatives, (see *carminatives*), under which head rank most of the aromatic herbs, roots, and seeds. Of the external stimulants many are called rubefacients, from the effect they have in irritating and consequently reddening the skin; and of these the principal are mustard, cantharides, and the stinging nettle.

Class XIII. ANTISPASMODICS.

179 Definition of antispasmodics.

Those medicines which have been found by experience to put a stop to convulsive motions, or spasmodic contractions of the muscular fibres, are called *antispasmodics.* Most of them are stimulants, some narcotics, and some are considered as specific antispasmodics.

Table of Antispasmodics.

I. Animal Products.

180 Table of antispasmodics.

Murias ammoniæ, *muriate of ammonia.* See table of *Stimulants.*
Moschus moschiferus, *musk.*
Mistura moschata, *musk mixture.*
Cervus elaphus.
Oleum animale, *animal oil.*
Castor fiber, *castor.*
Tinctura castorei, *tincture of castor.*
Tinctura castorei composita, *compound tincture of castor.*

II. Vegetable Products.

Cephaëlis ipecacuanha, *ipecacuanha.*
Nicotiana tabacum, *tobacco smoke.*
Ferula asafœtida, *asafetida.*
Alcohol ammoniatum fœtidum, *fetid ammoniated alcohol.*
Pilulæ asafœtidæ compositæ, *compound pills of asafetida.*
Emplastrum asafœtidæ, *asafetida plaster.*
Alcohol.
Æther sulphuricus, *sulphuric æther.*
Laurus camphora, *camphor.*
Emulsio camphorata, *camphorated emulsion.*
Mistura camphorata, *camphorated mixture.*
Tinctura camphoræ, *tincture of camphor.*
Linimentum camphoræ compositum, *compound liniment of camphor.*
Papaver somniferum, *opium.*
Tinctura opii, *tincture of opium.*
Tinctura opii camphorata, *camphorated tincture of opium.*

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Tinctura opii ammoniata, *ammoniated tincture of opium.*
Electuarium opiatum, *opiate electuary.*
Pilulæ opii, *opium pills.*
Bubon galbanum, *galbanum.*
Tinctura galbani, *tincture of galbanum.*
Pilulæ galbani compositæ, *compound pills of galbanum.*
Vitis vinifera.
Vinum rubrum lusitanum, *red Port wine.*
Citrus aurantium, *orange leaves.*
Artemisia absynthium, *common wormwood.*
Sub-carbonas potassæ impurus, *impure subcarbonate of potash.*
Aqua potassæ, *water of potash*, or *soap ley.*
Cardamine pratensis, *ladies smock.*
Conium maculatum, *hemlock.*
Succus spissatus conii maculati, *inspissated juice of hemlock.*
Fuligo ligni combusti, *wood soot.*
Hyoscyamus niger, *henbane.*
Succus spissatus hyoscyami nigri, *inspissated juice of henbane.*
Valeriana officinalis, *valerian.*
Tinctura valerianæ, *tincture of valerian.*
Tinctura valerianæ ammoniata, *ammoniated tincture of valerian.*
Extractum valerianæ sylvestris resinosum, *resinous extract of wild valerian.*

III. Mineral Products.

Hydrargyrum, *mercury.*
For most preparations of mercury, see table of Sialagogues.
Bitumen petroleum, *petroleum.*
Oleum petrolei, *oil of petroleum.*
Succinum, *amber.*
Oleum succini, *oil of amber.*
Oleum succini purissimum, *purified oil of amber.*
Sal succini, *salt of amber.*
Spiritus ammoniæ succinatus, *succinated spirit of ammonia.*

181 Effects and uses of antispasmodics.

All those substances which, whether introduced into the body or applied to its surface, have been found by experience to put a stop to convulsive movements or rigid contractions of the muscular fibres, are termed antispasmodics. Of these substances there are many which differ from each other very widely, both in respect of sensible qualities and chemical composition; which indeed is not surprising, when it is considered that spasmodic affections occur in various and even opposite states of the body; a circumstance which calls for nice discrimination on the part of the practitioner in the use of these remedies. Some of them being considerably stimulant in their operation, aggravate rather than alleviate spasm, when associated with plethora or obstruction. It is therefore of great importance to attend carefully to the state of the patient's body, previously to the exhibition of these medicines; to premise and accompany their use in epilepsy, chorea, and hysteria, by proper evacuations; and to select from the great variety of articles which this class contains, such as are best adapted to the particular form of spasm which it is our business to cure. Therapeutics.

Class XIV. NARCOTICS.

182 Definition of narcotics.

This term has been usually applied to those remedies which are calculated to relieve pain and procure sleep. They have also been termed anodynes and hypnotics, and most of them were formerly ranked in the class of sedatives.

Table of Narcotics.

183 Table of narcotics.

I. Vegetable Products.

Nicotiana tabacum, *tobacco.*
Vinum nicotianæ tabaci, *tobacco wine.*
Aconitum neomontanum, *aconite.*
Succus spissatus aconiti napelli, *inspissated juice of aconite.*
Papaver somniferum, *opium; white poppy heads.*
Tinctura opii, *tincture of opium.*
Tinctura opii camphorata, *camphorated tincture of opium.*
Syrupus opii, *syrup of opium.*
Extractum papaveris somniferi, *extract of white poppy heads.*
Pulvis opiatus, *opiate powder.*
Electuarium opiatum, *opiate electuary.*
Pilulæ opii, *opium pills.*
Rhododendron chrysanthum, *yellow-flowered rhododendron.*
Digitalis purpurea, *foxglove.*
Tinctura digitalis purpureæ, *tincture of foxglove.*
Arnica montana, *leopard's bane.*
Rhus toxicodendron, *poison oak.*
Conium maculatum, *hemlock.*
Succus spissatus conii maculati, *inspissated juice of hemlock.*
Hyoscyamus niger, *henbane.*
Succus spissatus hyoscyami nigri, *inspissated juice of henbane.*
Tinctura hyoscyami nigri, *tincture of henbane.*
Atropa belladonna, *deadly nightshade.*
Datura stramonium, *thorn-apple.*
Humulus lupulus, *hop.*
Lactuca virosa, *wild lettuce.*
Papaver rhœas, *wild poppy.*
Syrupus papaveris erratici, *syrup of wild poppy.*
Sium nodiflorum, *creeping skerrit.*

184 Effects and uses of narcotics.

There is no class of medicines in the administration of which more judgment and discrimination are requisite than in the administration of those which are termed narcotics. When given in full doses, much good or much mischief is sure to follow, according as they are prudently or mistakingly prescribed. What a common practice it is to give them whenever a patient complains of pain, without duly investigating the cause of that pain; whether it be the consequence of high inflammatory action, of a plethoric condition, or of a suppression of some periodical or habitual discharge! In these cases to prescribe any of the medicines belonging to this class,

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class, in a full or considerable dose, before the remedies suited to remove inflammation, plethora, and obstruction, had been resorted to, would only serve to aggravate the disease. And even where there is no condition of the body which contraindicates the use of narcotics, it is of great importance to adapt the doses not only to the age and constitution of the patients, but likewise to the particular form of the disease. For instance, in tetanus, hemicrania, and colica pictonum, opium, and other narcotic medicines, may be given in large doses with excellent effect; but in phthisis pulmonalis, typhus fever, and some other states of debility, small doses, repeated at proper intervals, are found to answer best.

In the administration of narcotics, it is moreover proper to consider whether in the particular case in which they appear to be indicated, they should be prescribed alone, or in combination with other medicines; and if in the manner last mentioned, with what sort of adjuncts. Thus, in cases of synochus, acute rheumatism, and the early stage of dysentery, they should be given in combination with calomel and antimonials; in cases of asthma and phthisis pulmonalis, with ammoniacum, squill, and other expectorants; in cases of cholera, with diluents and demulcents; in cases of diarrhœa, with astringents and aromatics; in hemorrhagic cases, with sulphate of zinc and other styptics; in hysteria, with the volatile alkali, ether, and fœtids; in convulsive affections, especially such as occur in children, with magnesia and other antacids *.

* *Synopsis of Materia Medica*, vol. ii. p. 228.

Class XV. ANTHELMINTICS.

185 Definition of anthelmintics.

Those medicines which are employed with a view to expel worms from the bowels, are called *anthelmintics*.

Table of Anthelmintics.

186 Table of anthelmintics.

I. Animal Products.

Murias ammoniæ, *muriate of ammonia.*
Aqua carbonatis ammoniæ, *water of carbonate of ammonia.*

II. Vegetable Products.

Anthemis nobilis, *chamomile flowers.*
Extractum anthemidis nobilis, *extract of chamomile.*
Nicotiana tabacum, *tobacco* in clysters.
Olea europæa, *olive oil* in clysters.
Allium sativum, *garlic.*
Ferula asafœtida, *asafetida* in clysters.
Convolvulus jalapa, *jalap.*
Convolvulus scammonia, *scammony.*
Pulvis scammonii compositus, *compound powder of scammony.*
Helleborus fœtidus, *stinking hellebore.*
Rheum palmatum, *rhubarb* in small doses.
Ricinus communis, *castor oil.*
Stalagmitis cambogioides, *gamboge.*
Ruta graveolens, *rue.*
Oleum volatile rutæ, *oil of rue.*
Juglans regia, *walnut rind.*
Tanacetum vulgare, *tansey.*
Valeriana officinalis, *valerian.*
Artemisia santonica, *worm-seed.*
Dolichos pruriens, *cowhage.*
Geoffrœa inermis, *cabbage-tree bark.*
Polypodium filix mas, *male fern root.*
Spigelia marilandica, *Carolina pink.*

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III. Mineral Products.

Hydrargyrum, *mercury.*
Submurias hydrargyri, *submuriate of mercury.*
Murias sodæ, *muriate of soda.*
Ferrum, *iron.*
Carbonas ferri, *carbonate of iron.*
Sulphas ferri, *sulphate of iron.*
Ferri limaturæ purificatæ, *purified iron filings.*
Tartris ferri et potassæ, *tartrate of iron and potash.*
Calx, *lime.*
Aqua calcis, *lime water* in clysters.
Stannum, *tin.*
Stanni pulvis, *powder of tin.*

187 Effects and uses of anthelmintics.

Of the medicines which belong to this class, some destroy the different species of worms which breed in the alimentary canal, by their chemical, others by their mechanical action upon those animals; but by far the greater number of anthelmintic or vermifuge medicines operate in no other manner than as drastic purges, bringing away the morbid accumulation of slime from the intestines, and with the slime, the worms which were lodged in it. After the worms have been brought away by these remedies, the bowels should be strengthened by bitters and other tonic medicines; and the use of green vegetables, or much garden stuff of any kind, and of malt liquor, should be forbidden.

Class XVI. CHEMICAL REMEDIES.

188 Chemical remedies.

Several of the substances that have been enumerated in the foregoing tables, act also on the animal system merely as chemical re-agents, either by counteracting acidity, dissolving calculous concretions, destroying fungous excrescences, &c. We shall here enumerate all the substances that may be considered as chemical remedies, and shall afterwards class them according to their particular action.

Table of Chemical Remedies.

189 Table of chemical remedies.

I. Animal Products.

Murias ammoniæ, *muriate of ammonia.*
Aqua ammoniæ, *water of ammonia.*
Carbonas ammoniæ, *carbonate of ammonia.*
Aqua carbonatis ammoniæ, *water of carbonate of ammonia.*
Sal cornu cervi, *salt of hartshorn.*
Cervus elaphus, *hartshorn.*
Phosphas calcis, *phosphate of lime.*
Cornu cervi ustum præparatum, *burnt hartshorn.*
Cancer astacus, *crabs eyes.*
Cancer pagurus, *crabs claws.*
Chelæ cancrorum præparatæ, *prepared crabs claws.*
Pulvis è chelis cancrorum compositus, *compound powder of crabs claws.*
Gorgonia nobilis, *red coral.*
Corallium rubrum præparatum, *prepared red coral.*

Ostrea

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Ostrea edulis, *oyster shells.*
Testæ ostreæ præparatæ, *prepared oyster shells.*
Spongia officinalis, *sponge.*
Spongia usta, *burnt sponge.*

II. Vegetable Products.

Carbonas potassæ, *carbonate of potash.*
Aqua potassæ, *water of potash*, or *caustic ley.*
Potassa, *potash.*
Potassa cum calce, *potash with lime.*
Carbonas potassæ, *carbonate of potash.*
Carbonas potassæ purissimus, *purified carbonate of potash.*
Aqua carbonatis potassæ, *water of carbonate of potash.*
Aqua supercarbonatis potassæ, *water of carbonate of potash.*

III. Mineral Products.

Sulphas cupri, *sulphate of copper.*
Sulphuretum antimonii, *sulphurate of antimony.*
Murias antimonii, *muriate of antimony.*
Sulphur sublimatum, *flowers of sulphur.*
Sulphuretum potassæ, *sulphuret of potash.*
Hydrosulphuretum ammoniæ, *hydrosulphuret of ammonia.*
Nitras potassæ, *nitrate of potash.*
Acidum nitrosum, *nitrous acid.*
Acidum nitricum, *nitric acid.*
Sapo hispanus, *Castile soap.*
Murias sodæ, *muriate of soda.*
Acidum muriaticum, *muriatic acid.*
Sulphas magnesiæ, *sulphate of magnesia.*
Carbonas magnesiæ, *carbonate of magnesia.*
Magnesia, *magnesia.*
Trochisci magnesiæ, *lozenges of magnesia.*
Acidum sulphuricum, *sulphuric acid.*
Acidum sulphuricum dilutum, *diluted sulphuric acid.*
Supersulphas aluminæ et potassæ, *supersulphate of alumina and potash*, or *alum.*
Sulphas aluminæ exsiccatus, *dried sulphate of alum.*
Argentum, *silver.*
Nitras argenti, *nitrate of silver.*
Oxidum arseniosum, *arsenious acid.*
Calx, *quicklime.*
Aqua calcis, *lime water.*
Bolus gallicus, *French bole.*
Carbonas calcis, *carbonate of lime, chalk.*
Carbonas calcis præparatus, *prepared carbonate of lime.*
Pulvis carbonatis calcis compositus, *compound powder of carbonate of lime.*
Trochisci carbonatis calcis, *lozenges of carbonate of lime.*
Potio carbonatis calcis, *potion of carbonate of lime.*
Aqua aëris fixi, *water of fixed air.*
Carbonas sodæ impurus, *impure carbonate of soda.*
Carbonas sodæ, *carbonate of soda.*
Aqua super-carbonatis sodæ, *water of supercarbonate of soda.*

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Of the substances above enumerated, some act as antacids, correcting morbid acidity in the stomach and bowels; as most of the preparations of ammonia, burnt hartshorn, crabs eyes and claws, coral, egg shells, carbonates of potash and soda with their preparations, magnesia, lime, and carbonate of lime. These have been often called *absorbents*.

190 Uses of chemical remedies.

191 Antacids.

Several of the chemical remedies act in a greater or less degree as lithontriptics, or such medicines as are capable of dissolving urinary calculi. The principal lithontriptics are, solutions of caustic potash, soap, sulphuric and muriatic acids, and carbonate of soda.

192 Lithontriptics.

"From the exhibition of alkaline remedies," says Mr Murray, "the symptoms arising from a stone in the bladder are very generally alleviated; and they can be given to such an extent that the urine becomes sensibly alkaline, and is even capable of exerting a solvent power on these concretions. Their administration cannot, however, be continued to this extent for any considerable length of time, from the strong irritation they produce on the stomach and urinary organs. The use, therefore, of the alkalies as solvents, or lithontriptics, is now scarcely ever attempted; they are employed merely to prevent the increase of the concretion, and to palliate the painful symptoms, which they do, apparently by preventing the generation of lithic acid, or the separation of it by the kidneys; the urine is thus rendered less irritating, and the surface of the calculus is allowed to become smooth.

"When the alkalies are employed with this view, they are generally given saturated, or even super-saturated with carbonic acid. This renders them much less irritating. It at the same time diminishes, indeed, their solvent power; for the alkaline carbonates exert no action on the urinary calculi; but they are still equally capable of correcting that acidity in the *primæ viæ*, which is the cause of the deposition of lithic acid from the urine, and therefore serve equally to palliate the disease. And when their acrimony is thus lessened, their use can be continued for any length of time *"

From the inconsiderable action which most of the lithontriptics can with safety be made to exert, when given by the mouth, it was some years ago proposed to apply them directly to the calculus, by injecting them through the urethra into the bladder †. In this way it is evident that their action must be much greater, and when the substances are used in a state of sufficient dilution, the practice is said to be perfectly safe.

* *Murray's Elements*, vol. i. p. 365.

† See *Foote's Successful Practice of Vesicæ Loturæ.*

193 Escharotics.

Several of the chemical remedies are employed externally as caustics or escharotics, to destroy fungous or callous parts of the body; to open an ulcer, or to change the diseased surface of a sore. The principal escharotics are, sulphuric and muriatic acid when concentrated; pure potash, nitrate of silver, muriate of antimony, sulphate and subacetate of copper, corrosive muriate of mercury, and arsenious acid.

A few are employed both externally and internally, to check putrefaction, or to correct the unpleasant smell of particular secretions, or of ulcers. The principal of these are charcoal and carbonic acid, though the mineral acids have also this effect.

PART

PART III. PRINCIPLES OF PHARMACY.

Chap. I. *General Operations of Pharmacy.*

THE operations of pharmacy are either mechanical or chemical. By the first the various articles employed in medicine are reduced to a proper state for exhibition, by cutting, rasping, grinding, pounding, &c.; and by the second they are subjected to various complex operations, which produce certain chemical changes in their nature and properties.

To the first of these heads we may refer the collection and preservation of simples. This chiefly refers to those articles that are of a vegetable nature, and which are either used fresh, or in a dried state.

194 Collection and preservation of simples.

Vegetables should be gathered chiefly from those soils in which they naturally delight, or in which they are found most commonly to rise spontaneously; for though many of them may be raised, and made to grow with vigour in very different soils, their virtue generally suffers by the change. A variation of seasons occasions also differences considerable enough to require often an allowance to be made in the quantity; plants in general proving weaker, though more luxuriant, in rainy than in dry seasons. Herbs and flowers are to be gathered in a clear dry day, after the morning dew is gone off from them. Leaves, for the most part, are in their greatest perfection, when come to their full growth, just before the flowers appear: flowers, when moderately expanded; seeds, when they begin to grow dry, before they fall spontaneously; woods and barks, as is supposed, in the winter; annual roots, before the stalks begin to rise; biennial roots, in the autumn of the first year: perennial roots, in the autumn after the leaves have fallen, or early in the spring before they begin to vegetate.

Of the vegetables which lose their virtue in being dried, the greater number, perhaps all, may be preserved for a considerable length of time, by impeding the exhalation of their natural moisture; for so long as they retain this, they seem to retain also their medical activity. Thus, roots have their virtue preserved by being buried in sand, which should be dry, that they may not vegetate; leaves and flowers, of a more corruptible nature than roots, by being beaten with about thrice their weight of fine sugar to prevent their corruption, and kept in a close vessel.

Plants which bear drying, are commonly hung in a warm airy place, defended from the sun. The colours of herbs and flowers are for the most part changed or destroyed in drying, by the sun's beams; but that their medicinal virtue suffers a like diminution, does not appear. This much is certain, that the heat of a culinary fire, equal to that of the sun in summer, does them no injury in either respect; and that both flowers and leaves, when thus hastily dried by fire, preserve the liveliness of their colour, and their smell and taste, more perfectly than by slow drying. The leaves of moderately juicy plants are reduced, by drying, to about one-fourth of their original weight.

Some roots, and some other parts of vegetables, how thoroughly soever they have been dried, are liable, in keeping, to grow mouldy and carious. This inconvenience might probably be obviated by dipping them, when dried, in boiling spirit of wine, or exposing them to its vapour in a close vessel. It is said, that some of the oriental spices are made less perishable, by being dipt in a mixture of lime and water *.

* *Lewis's Materia Medica.*

The drawers in which vegetable drugs are kept, should be made of such materials as are not likely to impart to them any unpleasant taste or smell; and the better to avoid this, they should be lined with paper. Such matters as are volatile, or which are likely to suffer from exposure to the air, or from insects, should be kept in glass vessels well stopped. Such fruits and oily seeds as are liable to become rancid, by being too warm, should be preserved in a dry cool place.

As most vegetable substances lose much of their sensible properties by long keeping, or acquire others which render them less proper for being used as internal medicines, they should be frequently replaced.

195 Pulverization.

One of the most common operations to which dry drugs are subjected, is that of being reduced to powder, by which they are rendered more efficacious, and are more conveniently exhibited. The pulverization of these matters is usually performed by means of pestles and mortars. These should be made of such materials as are not likely to impart to the powdered substance any noxious properties, and should at the same time be sufficiently hard, not to be broken or worn away during the operation. For the powdering of barks, roots, and similar substances, cast-iron mortars are the most convenient; and for such articles as are of a more brittle nature, mortars of glass or marble are commonly employed. All those made of copper, or any of its alloys, should be carefully avoided, as when the substance is very hard, or of such a nature as to act chemically on the metal, some portion of copper may be mixed with the medicine, and render it a virulent poison. For many purposes mortars made of common stoneware answer very well; but the best mortars of this kind are those made of well-baked clay, commonly called *Wedgewood's mortars*. The bottom of all these mortars should be hollow on the inside, and flat on the outside, and their sides should be moderately inclined. Those which are employed for reducing to powder such substances as produce much dust, should be provided with covers, both to prevent the lighter parts of the powder from being lost, and to defend the operator from being injured by such substances as are of a corrosive or poisonous nature. In general, wooden covers that have a rim to prevent their sliding off, and a hole sufficiently large to admit of the introduction of the pestle, answer very well; but where it is of consequence that no part of the article should escape, it is better to tie round the mouth of the mortar, and round the pestle, a piece of pliable leather, sufficiently large to admit of the free motion of the latter. Where this is not done, it will be proper for the operator to cover his mouth and nose with a handkerchief

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chief or wet cloth, and to stand in such a situation as that a current of air shall direct the acrid powder from him.

To avoid losing much of these light dry powders, a little spirit of wine, or oil, is sometimes put into the mortar, to prevent the lighter parts of the powder from rising. Care should, however, be taken, that the substance is of such a nature as not to be dissolved by the spirit, nor injured by the rancidity that the oil is likely to acquire; and in every case, as little as possible of either should be employed.

It is obvious that in reducing drugs to powder, too much of the article should not be put at once into the mortar.

Several substances require previous preparation before powdering; barks, woods, roots, should be perfectly dry, and should be either sliced or rasped before putting into the mortar; and such roots as are covered with a very fibrous bark, should be shaved after this has been removed, to take away such hairy filaments as are usually found between the bark and the wood. Gummy resinous substances, such as myrrh, which are liable to become soft when heated, should be powdered in very cold weather; and it is better, first to reduce them to a coarse powder, and expose this to the air for a day or two, before completing the pulverization, which will then be more easily effected. Some substances cannot be reduced to powder without the addition of some other matter; thus, camphor requires a little alcohol or oil; the emulsive seeds require the addition of some dry powder, and for aromatic oily substances, the addition of a little sugar is proper.

196 Sifting.

In order to separate the finer powder from the rest of the substance, apothecaries employ sieves of various forms. For such articles as require to be kept close, the sieve is composed of three parts; a middle part, which is properly the sieve for separating the finer part of the powder, a bottom for receiving the powder, and a top for preventing the escape of the finer dust.

When as much of the powder as is sufficiently fine, has passed through the sieve, the rest is to be returned into the mortar, and the pulverization continued and repeated, till as much as possible has passed the sieve. All the parcels of powder are then to be intimately mixed together, by rubbing them for a considerable time in the mortar.

197 Trituration.

Trituration consists in rubbing dry substances that are already pretty small in order to reduce them to a very fine powder, or to mix them intimately together. In the small way it is performed in the usual mortars; in the large way by means of a roller moved by water or by horses.

198 Levigation.

When it is required to reduce dry substances to a very fine, or what is called an *impalpable powder*, recourse is had to the operation called *levigation*, which is nothing more than rubbing the substance for a long time in a broad flat mortar, or upon a hard stone, with a muller, adding from time to time a little water or alcohol, so as to reduce the substance operated on to a kind of paste. This paste is rubbed till it is as smooth as possible, and is then spread on a stone or flat cake of chalk, till it is sufficiently dried. Sometimes levigated powders are made up into little conical lumps, and dried in that form. The substances on which levigation is performed are chiefly earths and metallic oxides.

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For the purpose of reducing metals into minute particles, they are either filed or granulated. It would not be improper that apothecaries should always prepare their own iron filings, as those procured from a smith's shop are generally very impure. The granulation of metals is effected by melting the metal, and either stirring it briskly with an iron rod till it is cold, or pouring it into water and stirring it as before; or lastly, by pouring it into a covered box, having its inside well rubbed with chalk, in which it is well shaken till cold, when the adhering chalk is to be washed away.

199 Granulation.

200 Elutriation.

Another mode of procuring the finest particles of such substances as are not soluble in water, is by what is termed *elutriation*, which is performed by diffusing in water the powder or paste to which they have been reduced by pulverization or levigation, and after the coarser particles have subsided, pouring off the water that holds in suspension the finer parts. The operation of levigation and subsequent diffusion is repeated, till as much as is required of the fine powder is obtained. This is afterwards to be separated from the water, either by decantation or filtration.

201 Filtration.

When the powder is so heavy as readily to fall to the bottom of the vessel, it is most conveniently separated by decanting off the water, either by pouring it gently off as long as it comes over clear, or by means of a crooked glass syphon fixed in a board that goes over the mouth of the vessel to keep it steady, as represented at fig.

When the powder does not readily subside, it is best separated by filtration, which is performed by means of a cone of common blotting paper, inserted into a funnel, or by means of a cloth or flannel bag. After all the fluid has passed through the filter, the powder that remains on the paper is to be carefully dried.

Decantation and filtration are more commonly employed to obtain any liquor clear from the powdery or other matters with which it is mixed.

203 Expression.

For obtaining the juices of vegetables or fruits, or the oils of seeds, &c. recourse is had to *expression*. The plants or fruits are put into bags or wrappers made of haircloth, and subjected to strong pressure by means of a screw press, the plates of which should be made of wood or tin, and by no means of lead. The pressure employed should at first be gentle, and should be increased gradually. The oily seeds or nuts are pressed between iron plates, which are usually warmed; but when used cold, the oil is milder and not so liable to become rancid.

Besides the mortars mentioned above, there are several other instruments employed in the operations of pharmacy, on which it is proper to make a few remarks.

204 Funnels.

Funnels ought to be made of tinned iron, or of glass; or of the same sort of baked earth or clay as the mortars, or of silver, or of block tin.

205 Infusing vessels.

Vessels used for preparing infusions, or for evaporating liquors, or for putting decoctions or other liquors into, to cool, ought to be made either of porcelain, or of stoneware, or of baked clay, or of earth such as the mortars are made of, or of glass; or such vessels as are not acted upon either by acid or alkaline liquors.

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For the same reasons, measures of all sorts, from the dram to a quart, ought to be made of tinned iron, or of stoneware, or of the baked earth or clay, or of glass; silver might be employed for the smaller measures of drams and ounces, and if taken care of, would in the end prove cheaper than the others: if other metallic vessels are used, the metal ought to be of such a sort as not to be affected by acid or alkaline, or other liquors; and they ought at all times to be kept extremely clean.

In distilling, in melting, and in calcining different bodies, no vessels ought to be employed which may be acted upon by, and give a noxious quality to, the substances to be prepared.

Most colleges of physicians in Europe formerly directed, that both weights and measures should be employed for dispensing medicines, ordering solid substances to be prepared by weight, fluid by measure; and they gave tables of the weights and measures they wished should be used, in the beginning of their different dispensatories: but it having been found that the promiscuous use of weights and measures gave sometimes occasion to mistakes, the colleges of Edinburgh and of Stockholm have, in the last edition of their pharmacopœias, rejected entirely the use of measures, and ordered both fluid and solid substances to be prepared by weight. It is to be wished that all the colleges in Europe would follow their example.

206 Measures and weights.

Measures made to contain a certain determined weight of water are certainly very useful in pharmacy; but if such are allowed they ought to be employed only for measuring watery liquors, as the specific gravities of other fluids differ so much from one another.

In every country, all weights and measures used for the preparation of medicines ought to be made according to the directions of the college of physicians; standards of them ought to be kept in proper places, and all those ought to be stamped, to shew that they were made according to the standard.

The principal *chemical* operations of pharmacy may be arranged under the following heads.

207 Infusing.

1. The infusing certain substances in cold or in hot water, or in wine, to extract their saline or light gummy parts, together with some of their fine volatile principles, which are miscible with water.

208 Boiling.

2. The boiling them in water to extract the same principles, together with others that are more fixed, or which are capable of being dissolved by heat, and afterwards of being kept suspended by the gummy and mucilaginous parts which have been dissolved in the water; thus a certain proportion of resin is found to be suspended in decoctions of the bark, of opium, and of other drugs.

209 Evaporating.

3. The evaporating watery infusions and decoctions, and the expressed juices of many vegetables, to obtain their fixed parts which have been dissolved in a watery menstruum. In this manner jellies, robs, and extracts, are prepared.

210 Digesting.

4. The infusing or digesting certain vegetable substances in pure vinous spirit to extract their fine volatile oils and their resinous parts; or in spirit mixed with water, called proof-spirit, to extract, along with those principles, some of their gummy parts.

5. The evaporating of such tinctures to obtain their resinous and more fixed parts; in which way resinous extracts are got from bark, jalap, from opium, and from other substances.

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6. The distilling fragrant vegetable substances with water, in order to procure their fine volatile principles, which come over with the water into the vessels placed to receive it. In this manner the simple distilled waters (as they are called), which have the flavour and taste of the substances from which they are distilled, are prepared; and the fine essential oils of the plants which have been distilled are found either floating on the top of the water, or sunk to the bottom of it, according as they are specifically lighter or heavier than water.

211 Distillation.

7. The distilling of the same substances in vinous spirit to obtain the same fragrant volatile parts, intimately united with the spirit; in which manner are made the spirituous liquors improperly called spirituous waters.

In distilling, care ought to be taken to make the vapours which arise condense properly in the vessels set to receive them when they have assumed the form of a liquor; which is to be effected, 1. By regulating the fire, and never raising the degree of heat beyond what is necessary; and, 2. By making the vapours pass through such a cool medium, as will condense them into a liquid.

1. The degree of heat is regulated by the figure of the furnace in which the fire is placed, and by the quantity of wood or of coal that is used. Where a great degree of heat is wanted, the vessels are put in an open fire, placed in a reverberatory furnace. Where a less degree of heat is sufficient, they are put into sand contained in an iron pot, below which the fire is lighted in a common furnace. Where a still smaller degree is required, the vessel is put into a pot with sand, and a lamp in place of coals fixed below it. At other times the retort, or vessel with the liquor to be distilled, is put into a vessel full of water or other liquor, set over a fire, so that it cannot be heated beyond a certain degree.

2. The condensation of vapours arising from substances subjected to distillation is effected, as before observed, by making the vapour pass through such a cool medium, as will condense it into a liquor before it reaches the bottom of the vessels set to receive it.

In distilling medicated waters or spirits, the herbs or other vegetable substances, and the water or the spirit, are put into a still placed in a proper furnace, on which is fixed a large head, with a long crane-necked or curved tube coming from the top of it, which after descending and going off a little to one side, enters into the upper end of a long spiral pipe, called a worm, which is fixed in a large cask, called the worm-tub or refrigeratory, with its two ends piercing the cask; and to its lower end is fixed a proper vessel for receiving the distilled liquor. The worm-tub, which has a cock at the lower part of it for letting out water occasionally, is filled with cold water before the distillation begins, and is renewed in the course of the distillation if it begins to heat, by drawing it off by means of the cock, and pouring fresh cold water into the worm-tub. After every thing is fitted, the fire is lighted, and the distillation is continued so long as the water comes over sufficiently impregnated with the vegetable substances put into the still.

In the distillation of vegetable or animal substances with

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with water, or with spirit, it ought to be observed, 1. That there ought to be put into the still such an additional quantity of water as will prevent the solid substances which are subject to the distillation from being burnt, as this additional water does not at all weaken the produce; for the most volatile parts of the subject rise first, and impregnate the liquor which first comes over, and the water remains behind in the still. 2. That a gentle fire, such as is just capable of keeping the liquor boiling, is preferable to a strong fire, particularly towards the end of the process. 3. That the distillation is to be continued so long as the liquor comes over fully impregnated with the volatile parts of the vegetable substances which are the subjects of the distillation; but is to be put an end to, so soon as it is perceived to become weak, which is known by tasting from time to time the liquor which comes over.

8. The distilling of vegetables or animal substances in retorts without water, in order to make them rise, and bring over by the force of fire, their watery parts, an acid, or volatile alkaline salt, according to what nature the substances are of, and an empyreumatic oil, into the receiver; and to get the more fixed, earthy, and oily parts, which are left behind in the retort.

In distilling substances which require a greater degree of heat to raise their volatile parts, than the liquors above mentioned, or which are of such a nature as to act upon, and corrode the vessels employed in these processes just mentioned, it is necessary to use the vessels made of glass or of earth, which have been called retorts, from their neck being bent on one side. Such retorts are employed in pharmacy for distilling the mineral and the vegetable acids, and the preparations made from them; in distilling animal and vegetable substances by themselves to procure their watery, saline, or oily parts; for purifying quicksilver, and preparing the *muriate of antimony*, &c. and they may be used as subliming glasses for making mercurial and other preparations.

In distilling with retorts, the matter to be distilled is put into the retort which is commonly placed in sand, contained in an iron pot, fixed above a furnace, into which the fire is put; but on some particular occasions, where only a small degree of heat, not exceeding that of boiling water, is wanted, the retort is placed in a water bath.

After the retort containing the matter to be distilled is fixed, the end of it is either put immediately into the mouth of another long-necked vessel called a receiver (from its being placed to receive the distilled liquor), and the two vessels are luted together by means of a proper cement; or it is first put into the end of a long glass tube called an adopter, which is luted to it, and the other end of the tube is put into the mouth of the receiver, and fixed to it by means of a cement.

The receivers are either made round like a decanter, without any other opening than the mouth; or they are made with a tube coming out from their bottom, or from the side near it, to which another receiver may be fixed, and when they are thus made they are called tubulated receivers, and are very convenient for performing processes where the matter put into the retort yields products of different kinds, as in the distillation of spirit with the mineral acids; for the receiver or bottle fixed to the tube may be changed as the different products come over, so that each of them may be obtained separately. And in distilling substances which yield very volatile products, one tubulated retort may be put after another so as to enlarge the space for the condension of vapours; and in distilling these very volatile substances it is sometimes necessary to make a small puncture into the lutes between the retort and the receiver, to allow some of the vapour to escape to prevent its bursting the vessels.

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The use of the long intervening tube called an adopter, which is put often between the retort and the receiver, is to increase the distance from the retort (that is immediately exposed to heat) to the receiver; so that the receiver may be in less danger of being heated, and that the vapour may be cooled in its passage through this tube, and condense more readily in the receiver. It is likewise of another use, which is to give us an opportunity of seeing the vapour in its passage from the retort to the receiver, so that we may know how the distillation is going forward, and when it is proper to change the receivers, when the different liquors come over from materials which yield products of different kinds.

212 Incineration.

9. The burning vegetable substances in an open vessel to obtain a fixt alkaline salt.

10. The burning the bones of animals, or the shells of fishes, to procure their earthy parts; in which manner the calcined hartshorn, the powder of crabs claws, and of oyster shells, are procured.

213 Neutralization.

11. The mixing acid and alkaline salts in a fluid state, to form the neutral salts, which may be separated from the water either by evaporating, with a slow heat, such a quantity of the water as to allow the salts to shoot into crystals when set in a cool place, or by continuing the evaporation till the salts become dry.

12. The dissolving certain metallic substances, or certain earths, in acid liquors, for obtaining metallic and earthy salts, which may be got in a solid form in the same manner as the neutral salts.

214 Crystallization.

13. The evaporating the purified expressed juices of certain vegetable substances to the consistence of a cream, and then setting them by for months, in a cool place, to allow the essential acid salts to concrete into crystals. See CRYSTALLIZATION.

14. The distilling in proper vessels vitriol or other substances which contain the sulphuric acid, in order to get it separate from them; and the burning of sulphur mixed with a small portion of nitre, under particular vessels, so contrived, and so placed, as to collect the same acid.

15. The distilling nitre, or sea salt, mixed with a certain portion of the sulphuric acid, in order to obtain pure the nitric or muriatic acid.

215 Sublimation.

16. The subliming certain substances that become volatile by the application of heat, into proper vessels; and either to unite two of them together for the formation of a third, as is done in the preparation of the corrosive sublimate of mercury, when the muriatic acid is united to the quicksilver, or to separate the volatile parts of any substance from the fixt, as is done in the sublimation of volatile alkaline salts and of the acid of benjamin.

216 Melting.

17. The melting by the force of fire such substances as become fluid by the application of heat, so that they may be separated from or united to other bodies. Thus

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by particular management and the addition of certain substances, metals are separated from their ores. And resin and bees-wax are intimately united together; or they are dissolved in fixed oils, for the preparation of plasters, ointments, liniments, &c. And sulphur is united to quicksilver for the making of a black or red sulphuret.

217 Oxidation.

18. The applying of heat to metals, either to oxidate them, or to separate certain volatile substances with which they are combined, or to purify them from more oxidable metals with which they are alloyed. Thus mercury is reduced to a red oxide merely by the continued application of heat and air; the sulphuret of antimony is deprived of its sulphur by roasting, and silver is separated from lead by being exposed to such a heat, as, while it only fuses the silver, reduces the lead to an oxide. See CHEMISTRY.

218 Roasting.

CHAP. II. *Of the principal forms in which Medicines are exhibited.*

219 Officinal forms.

THE principal officinal preparations of the simple medicines, for the making of which directions are given in the Pharmacopœias, consist of *powders*, *pills*, *troches*, *electuaries*, *inspissated juices*, *extracts*, *infusions*, *decoctions*, *mucilages*, *emulsions and mixtures*, *syrups*, *tinctures*, *wines*, for internal exhibition; and *cataplasms*, *liniments*, *ointments*, *cerates*, *and plasters*, for external application.

220 Powder.

The form of *powder* is one of the most simple, and very convenient for the exhibition of a variety of medicines. It is of course adapted only to such substances as are easily reduced to powder, and such as are not too bulky to be taken in a moderate dose. Hence emollient and mucilaginous herbs and roots are improperly ordered in the state of powder, as they are too bulky; alkaline salts, whether fixed or volatile, are improper, as they in general either deliquesce in the air, or evaporate. Such articles as are of a very disagreeable taste, or offensive odour, are also more conveniently given in some other form.

In preparing compound powders, care should be taken that the several ingredients should be intimately mixed together. Some of them may in general be most properly powdered separately, but it is often of advantage to powder them together. They should be kept in a closely stopped phial, and such as are apt to lose part of their virtue by long keeping, should be prepared in small quantities.

The dose of powders should be so regulated as seldom to exceed a dram. The substance in which they are to be taken should be of such a nature as to mix properly with them, so that they neither float at the top, nor sink too rapidly to the bottom of the vessel.

221 Pill.

The form of *pill* is most convenient for such articles as do not require to be given in a large dose, and are so unpleasant in taste or smell, that they cannot be conveniently given in the form of a powder. As many patients can swallow pills, who cannot take medicines in a less solid form, those substances which are usually ordered in powder, are not unfrequently formed into pills, when their bulk is not so great as to render the pills too numerous for a single dose.

The most usual substances that enter into the composition of pills are resins, gum-resins, extracts, and similar medicines. Deliquescent salts are usually improper except in small quantity, and then they should be combined with some gummy powder. Such salts as are efflorescent, as *carbonate of soda*, may enter into the composition of pills: but they should be previously exposed to the air, so as to fall into powder. The liquid substances employed to form the pills into a proper mass, must be varied according to the nature of the more solid ingredients. Powders require syrup, mucilage, balsams, soap, conserve, or honey. Gum resins and extracts are sometimes sufficiently soft without any addition; but when this is required, a little spirit or wine is the most proper. When the mass is to be composed of a mixture of gum resins and powders, the former should be first moistened with the prescribed liquid, then the powders added, and the whole beaten well together, till they are reduced into a uniform plastic mass.

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A dram of the pilular mass is generally divided into about twelve pills, so that each pill may weigh about five grains.

The masses for pills should be kept in bladders, these should be moistened now and then, either with a little wine, or with some of the same liquid that was employed in forming the mass.

222 Troches.

Troches or lozenges are hard, round, flat cakes, formed of such substances as are intended to be gradually dissolved in the mouth, and thus pass by degrees into the stomach, or in their passage thither act on the throat or larynx. They should be formed of such substances as are soluble in the saliva, and are not of a disagreeable taste. They usually contain a great deal of sugar, and some gummy matter to render them coherent.

223 Electuaries.

Electuaries are less solid than pills, being of such a consistence that they may be rolled up into a bolus, so as to be easily swallowed. They are chiefly composed of powders mixed up with syrup or honey. The substances that enter into the composition of electuaries are chiefly the milder alterative medicines, or gentle laxatives. The stronger cathartics, emetics, and such substances as are of an unpleasant taste, such as bitters, the fetid gum-resins, and very heavy powders, are improper. The liquid employed to form electuaries is usually syrup or honey, the proportion of which is regulated by the nature of the more solid ingredients, but is usually of nearly equal weight.

224 Confections.

Confections are now considered as synonymous with electuaries, as they differ from ordinary electuaries in nothing but being composed of more aromatic ingredients.

225 Conserves.

Conserves may be considered as electuaries formed of only two ingredients, one of which is sugar, and the other the pulp of some fruit, the petals of flowers, or the outer rind of Seville oranges.

226 Extracts and resins.

Extracts and resins are pharmaceutical preparations, the rationale of which is very little understood. Dr Andrew Duncan, junr. has given an excellent account of them, which we shall here copy.

"Extract in pharmacy has long been used, in the common and true acceptation of the term, to express a thing extracted, and therefore it was applied to substances of all kinds which were extracted from heterogeneous bodies, by the action of any menstruum, and again reduced to a consistent form, by the evaporation

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of that menstruum. Lately, however, extract has been used in a different and much more limited sense, as the name for a peculiar principle, which is often indeed contained in extracts, and which before had no proper appellation. It is in the former sense that we employ it here, and in which we wish it to be only used, while a new word should be invented as the name of the new substance. Till a better be proposed, we shall call it *extractive*.

" Extracts are of various kinds, according to the nature of the substances from which they are obtained, and the meustruum employed; but they commonly consist of gum, sugar, extractive, tannin, cinchonin, gallic acid, or resin, or several of them mixed in various proportions. The menstrua most commonly employed are water and alcohol. The former is capable of extracting all the substances enumerated, except the resin, and the latter all except the gum. Wine is also sometimes employed, but very improperly; for as a solvent it can only act as a mixture of alcohol and water, and the principles which it leaves behind on evaporation are rather injurious than of advantage to the extract.

" Water is the menstruum most commonly employed in making extracts, as it is capable of dissolving all the active principles except resin, and can have its solvent powers assisted by a considerable degree of heat.

" Watery extracts are prepared by boiling the subject in water, and evaporating the strained decoction to a thick consistence.

" It is indifferent with regard to the medicine, whether the subject be used fresh or dry; since nothing that can be preserved in this process will be lost by drying. With regard to the facility of extraction, however, there is a very considerable difference; vegetables in general giving out their virtues more readily when moderately dried than when fresh.

" Very compact dry substances should be reduced into exceedingly small parts, previous to the affusion of the menstruum.

" The quantity of water ought to be no greater than is necessary for extracting the virtues of the subject. This point, however, is not very easily ascertained; for although some of the common principles of extracts be soluble in a very small proportion of water, there are others, such as tannin, of which water can dissolve only a small proportion, and cannot be made to take up more by any length of boiling; besides we have no very good method of knowing when we have used a sufficient quantity of water; for vegetable substances will continue to colour deeply successive portions of water boiled with them, long after they are yielding nothing to it but colouring matter. Perhaps one of the best methods is to boil the subject in successive quantities of water, as long as the decoctions form a considerable precipitate with the test which is proper for detecting the substance we are extracting, such as a solution of gelatin for tannin, of alum for extractive, &c.

The decoctions are to be depurated by colature, and afterwards suffered to stand for a day on two, when a considerable quantity of sediment is usually found at the bottom. If the liquor poured off clear be boiled down a little, and afterwards suffered to cool again, it will deposit a fresh sediment, from which it may be decanted before you proceed to finish the evaporation. The decoctions of very resinous substances do not require this treatment, and are rather injured by it, the resin subsiding along with the active dregs.

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" We would advise the decoctions to be evaporated after they have been filtered boiling hot, without any further depuration; because some of the most active principles of vegetable substances, such as tannin, are much more soluble in boiling than in cold water, and because almost all of them are very quickly affected by exposure to the atmosphere. Therefore, if a boiling decoction, saturated with tannin, be allowed to cool, the greatest part of the very principle on which the activity of the substance depends will separate to the bottom, and according to the above directions, will be thrown away as sediment. The same objection applies more strongly to allowing the decoction to cool, and deposit fresh sediment, after it has been partially evaporated. Besides, by allowing the decoctions to stand several days before we proceed to their evaporation, we are in fact allowing the active principles contained in the decoction to be altered by the action of the air, and to be converted into substances, perhaps inactive, which also are thrown away as sediment.

" The evaporation is most conveniently performed in broad shallow vessels; the larger the surface of the liquor, the sooner will the aqueous parts exhale. This effect may likewise be promoted by agitation.

" When the matter begins to grow thick, great care is necessary to prevent its burning. This accident, almost unavoidable if the quantity be large, and the fire applied as usual under the evaporating bason, may be effectually prevented, by carrying on the inspissation, after the common manner, no further than to the consistence of a syrup, when the matter is to be poured into shallow tin or earthen pans, and placed in an oven, with its door open, moderately heated; which acting uniformly on every part of the liquid, will soon reduce it to any consistence required. This may likewise be done, and more securely, by setting the evaporating vessel in boiling water; but the evaporation is in this way very tedious.

" Alcohol is by far too expensive to be employed as a menstruum for obtaining extracts, except in those cases where water is totally inadequate to the purpose. These cases are,

" 1. When the nature of the extract is very perishable when dissolved in water, so that it is liable to be decomposed before the evaporation can be completed, especially if we cannot proceed immediately to the evaporation.

" 2. When water is totally incapable of dissolving the substance to be extracted, and

" 3. When the substance extracted can bear the heat of boiling alcohol without being evaporated, but would be dissipated by that of boiling water; that is, when it requires a heat greater than 176°, and less than 212°, for its evaporization.

" In the last case, the alcohol must be perfectly free from water, because the heat necessary to evaporate it at the end of the process would frustrate the whole operation. Hence, also, the subject itself ought always to be dry; those substances which lose their virtue by drying, lose it equally on being submitted to this treatment with the purest alcohol.

" In this way the alcoholic extract of some aromatic

substances.

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substances, as cinnamon, lavender, rosemary, retain a considerable degree of their fine flavour.

"In the second case, the alcohol need not be so very strong, because it is still capable of dissolving resinous substances, although diluted with a considerable proportion of water.

"In the first case, the alcohol may be still much weaker, or rather, the addition of a small proportion of alcohol to water will be sufficient to retard or prevent the decomposition of the decoction.

"The alcohol employed in all these cases should be perfectly free from any unpleasant flavour, lest it be communicated to the extract.

"The inspissation should be performed, from the beginning, in the gentle heat of a water-bath. We need not suffer the alcohol to evaporate in the air; the greatest part of it may be recovered by collecting the vapour in common distilling vessels. If the distilled spirit be found to have brought over any flavour from the subject, it may be advantageously reserved for the same purposes again.

"When diluted alcohol is employed, the distillation should only be continued as long as alcohol comes over; and the evaporation should be finished in wide open vessels.

"Pure resins are prepared, by adding to spirituous tinctures of resinous vegetables, a large quantity of water. The resin, incapable of remaining dissolved in the watery liquor, separates and falls to the bottom; leaving in the menstruum such other principles of the plant as the spirit might have extracted at first along with it. But this is only practised for the purpose of analysis *."

* *Duncan's New Dispensatory*, chap. xxxv.

Of infusions and decoctions it is unnecessary for us to make any farther remarks, after what was observed in N° 200 and 201.

227 Mucilages.

Mucilages are solutions of the pure gums, or of similar substances, in water. They should not be made too thin, as they are then more readily decomposed on exposure to the air.

228 Mixtures and emulsions.

Mixtures are liquid preparations composed of substances that are not soluble in water, as various powders, barks, roots, &c. Emulsions differ from mixtures in being composed of oily or resinous ingredients, suspended in water by means of yolk of egg, honey, or mucilage. Both these preparations should be made as they are required, as few of them keep well.

229 Syrups.

Syrups are solutions of sugar, either in plain water, in the juice of some fruit, or in some vegetable infusion or decoction. They are employed chiefly to render mixtures or other liquid medicines more palatable, or to mix up powders and other solid ingredients into pills, electuaries, or troches. The proportion of sugar employed in the making of syrups should be so regulated, as to preserve the syrup in the same state as when first made. If too little sugar has been employed, the syrup will suffer decomposition, and ferment; if too much, part of the sugar will separate in crystals, leaving the remainder too weak.

230 Tinctures.

Formerly the term tincture was employed to denote any transparent solution, whether in water or spirit, that was coloured. At present it is commonly applied to solutions made by digestion in alcohol, or in proof spirit, though it is frequently extended to solutions in ether, or in ammoniated alcohol. For the action of alcohol as a menstruum, see CHEMISTRY. Principles of Pharmacy.

In making alcoholic tinctures, we must observe that the virtues of recent vegetable matters are very imperfectly extracted by spirituous menstrua. They must therefore be previously carefully dried, and as we cannot assist the solution by means of heat, we must facilitate it by reducing the solvend to a state of as minute mechanical division as possible. To prevent loss, the solution is commonly made in a close vessel, and the heat applied must be very gentle, lest it be broken by the expansion of vapour.

The action of tinctures on the living system is always compounded of the action of the menstruum and of the matters dissolved in it. Now, these actions may either coincide with, or oppose each other; and as alcohol is at all times a powerful agent, it is evident that no substance should be exhibited in the form of a tincture, whose action is different from that of alcohol, unless it be capable of operating in so small a dose, that the quantity of alcohol taken along with it is inconsiderable.

Tinctures are not liable to spoil, as it is called, but they must nevertheless be kept in well closed phials, especially when they contain active ingredients, to prevent the evaporation of the menstruum.

They generally operate in doses so small, that they are rarely exhibited by themselves, but commonly combined with some vehicle. In choosing the latter, we must select some substance which does not decompose the tincture, or at least separate nothing from it in a palatable form.

The London college directs all tinctures, except that of muriate of iron, to be prepared in close phials.

The Dublin college explain, that when any other substances are to be digested, they mean it to be done with a low degree of heat; and when they are to be *macerated*, it is to be done with a degree of heat between 60° and 90° *.

* *Duncan's Dispensatory*, chap. xxx.

Medicated wines and medicated vinegars differ from tinctures in nothing but the menstruum.

231 Cataplasms.

Of the external applications, the preparations of which are given in the Pharmacopœias, cataplasms or poultices may be considered as extemporaneous, being never kept ready made.

232 Liniments, ointments, and cerates.

Liniments, ointments, and cerates, are compositions of fatty matters, either animal or vegetable, or both, employed as external emollients. They differ only in consistence, liniments being very soft, or nearly fluid; ointments sufficiently hard not to melt in the ordinary temperature of the atmosphere; and cerates being of such a consistence as to be readily spread on cloth, &c. without the assistance of heat. These last commonly contain a considerable proportion of wax, whence their name.

233 Plasters.

Plasters are more solid than cerates, and usually require the aid of heat to spread them on the proper substance for application, which is usually leather. Plasters sometimes contain powders in their composition, and in preparing these it is proper first to melt the fatty ingredients, and sprinkle in the powder when the melted matter is beginning to cool.

PART

History of Simple and Officinal Medicines.

PART IV. A BRIEF ACCOUNT OF THE ARTICLES OF THE MATERIA MEDICA, WITH THEIR OFFICINAL PREPARATIONS.

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Chap. I. *Animal Substances.*

234 Phosphorus.

1. Phosphorus, see Chemistry *Index.*

Some daring practitioners have lately ventured to recommend the *internal* use of this active inflammable in the advanced state of typhus, in palsy and other cases of great debility. Taken into the stomach in a moderate quantity (below a grain) it produces heat in that organ, accelerates the pulse, promotes perspiration, and is said to give unusual vigour to the body. In larger quantity it produces inflammation of the stomach and bowels, followed by gangrene and death. Dose one-eighth to one-fourth of a grain in ether, or incorporated with mucilage.

The *internal* use of this substance appears to us to be more than *doubtful;* but we think we have experienced some benefit from it externally, when dissolved in oil, in paralytic and rheumatic cases.

235 Muriate of ammonia.

2. Murias Ammoniæ, E. SAL AMMONIACUS, L. D. Muriate of ammonia. *Sal ammoniac* (D).

The purest muriate of ammonia of commerce is that prepared by sublimation, and which is formed of large convexo-concave cakes, firm and elastic, not easily broken, and difficult to be cut. It is of a yellowish white colour, of little smell, and of a very sharp saline taste.

It is found native in the neighbourhood of volcanoes; but is usually prepared for medical purposes either from the dung of animals that feed on salt marshes; or by decomposing sulphate of ammonia by muriate of soda, or by immediately combining ammonia with muriatic acid.

Internally it is sometimes given as a stimulant in typhus fevers in doses of 20 or 30 grains mixed with camphorated mixture; but it is principally employed externally in lotions and embrocations, either as a refrigerant to cool the surface in sprains and inflammations, or as a stimulant to disperse tumors or morbid accumulations of fluids, or to quicken the circulation, as in chilblains, &c.

Officinal Preparations.

236 Water of ammonia.

a. Aqua Ammoniæ, E. AQUA AMMONIÆ PURÆ, L. LIQUOR ALKALI VOLATILIS CAUSTICUS, D. Water of Ammonia. *Water of Pure ammonia. Caustic solution of volatile alkali. Strong spirit of sal ammoniac.*

This is prepared by decomposing muriate of ammonia by means of quicklime with the addition of water, and afterwards distilling off the strongest portion with a gentle heat. The preparations of the different colleges vary a little, the Edinburgh Pharmacopœia ordering one pound of muriate of ammonia to one pound and a half of quicklime; the London one pound to two pounds; and the Dublin 16 ounces to two pounds. No great quantity of water is necessary. The lime is first slaked with part of the water, and after it is cold, the salt and rest of the water are added, and the distillation carried on in well closed vessels. The Edinburgh college directs Woolf's apparatus to be employed as a receiver, and orders all the separate liquors to be mixed together.

The *solution of ammonia* should be perfectly limpid and transparent, should have an extremely pungent odour, should not effervesce with acids, and should produce no precipitate on the addition of alcohol or lime water. It should be kept in small bottles well stopt with ground stoppers, and should stand in a very cool place.

This preparation is a very powerful stimulant, irritating and inflaming the skin and nostrils, when applied externally or snuffed up the nose. Hence its use as a rubefacient in rheumatism, cynanche, paralysis, and as a general stimulus in syncope, hysteria, &c. It is scarcely used internally. See below.

237 Ammoniated alcohol.

b. Alcohol ammoniatum, E. SPIRITUS AMMONIÆ, L. SPIRITUS ALKALI VOLATILIS, D. Ammoniated alcohol. *Spirit of Ammonia. Spirit of volatile alkali.*

This, as prepared by the Edinburgh Pharmacopœia, is merely a solution of ammonia in alcohol, and is prepared by decomposing eight ounces of muriate of ammonia by 12 ounces of quicklime, with the addition of eight ounces of water, and 32 ounces of alcohol, and distilling off the alcohol. The preparation of the London and Dublin colleges is made by mixing four ounces of muriate with six ounces of potashes and three pints of alcohol. The latter therefore contains much *carbonate of ammonia,* and is not so strong as the former.

238 Carbonate of ammonia.

c. Carbonas Ammoniæ, E. AMMONIÆ PREPARATA, L. ALKALI VOLATILE MITE, D. Carbonate of ammonia. *Prepared ammonia. Mild volatile alkali.*

This is prepared by mixing together one pound of muriate of ammonia, and twelve pounds of pure carbonate of lime or chalk, after being reduced to powder separately, and afterwards subliming.

This preparation, as it occurs in the shops, is composed of irregular masses of a very white, nearly opaque salt, of a strong pungent odour, and sharp alkaline taste. It requires to be kept closely stopped from the air, by the action of which it crumbles into powder, and its volatile part is dissipated. When pure, it should be entirely volatilizable by heat, but if any thing remains,

(D) The letters E. L. D. affixed to the articles in this part denote that they are articles of the Edinburgh, London, or Dublin Pharmacopœias.

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mains, there is reason to suppose that carbonate of potash or of lime is mixed with it; and those impurities are most likely to be presentif it is purchased in the form of a powder.

Carbonate of ammonia in its medical properties resembles the solution of ammonia, but it is not so strong. It is chiefly employed for smelling bottles, which are used in cases of hysteria or syncope, and is often formed into a neutral salt with the juice of lemons (*citrate of ammonia*), and given as a gentle diaphoretic. It is sometimes given alone, or mixed with aromatics, in the form of a bolus, as a diaphoretic or stimulant. Dose five to ten grains.

239 Water of carbonate of ammonia.

d. AQUA CARBONATIS AMMONIÆ, E. AQUA AMMONIÆ, L. LIQUOR ALKALI VOLATILIS MITIS, D. Water of carbonate of ammonia. *Liquor of mild volatile alkali.*

This is merely a solution of carbonate of ammonia in water, and might be properly prepared by dissolving a certain proportion of that salt in distilled water. The colleges of Edinburgh and Dublin direct it to be made by mixing together 16 ounces of muriate of ammonia, and the same quantity of carbonate of potash, pouring upon them two pounds of water, and distilling to dryness. In the London Pharmacopœia, the proportions are one pound of the muriate, a pound and a half of potashes, and four pints of water, drawing off two pints by distillation with a slow fire.

This solution should be transparent and colourless; should produce a strong coagulum on the addition of alcohol, and should effervesce with acids.

It is often employed in medicine, both internally and externally. Internally it is given, first as an emetic, in a dose of from 1 to 2 drams: secondly, as a diaphoretic; dose about 50 drops: thirdly, as a stimulant, 20 drops to a dram: fourthly, as an antispasmodic, in a similar dose: fifthly, as an antacid: and sixthly, as an anthelmintic combined with oil into an emulsion.

240 Water of acetate of ammonia.

e. AQUA ACETITIS AMMONIÆ, E. AQUA AMMONIÆ ACETATÆ, L. LIQUOR ALKALI VOLATILIS ACETATI, D. SPIRITUS MINDERERI. Water of acetite of ammonia. *Water of acetated ammonia. Liquor of acetated volatile alkali. Mindererus's spirit.*

This is a secondary salt, formed by neutralizing carbonate of ammonia with distilled acetous acid.

It forms a tolerably transparent solution, commonly of a greenish cast, of little smell, and of a weak saline taste. It should shew no signs of effervescence on the addition of either acetous acid or carbonate of ammonia.

This medicine acts as a gentle diaphoretic, of considerable use in low fevers, and several inflammatory complaints. It may be given in a dose of 3—6 drams, in the form of a draught or julep. It should be assisted by warm clothing, and warm diluent liquors.

241 Hydrosulphuret of ammonia.

f. HYDROSULPHURETUM AMMONIÆ, E. Hydrosulphuret of ammonia.

This preparation has been newly introduced into medical practice, by the Edinburgh college, who direct it to be prepared by subjecting 4 ounces of water of ammonia to a stream of gas arising from a mixture of 4 ounces of sulphuret of iron, and 8 ounces of muriatic acid, previously diluted with $2\frac{1}{2}$ pounds of water.

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This preparation forms a solution of a dark green colour and very fetid odour. It should more properly be called sulphureted hydrogenet of ammonia. It acts powerfully on the living system. It induces vertigo, drowsiness, nausea, and vomiting, and lessens the action of the heart and arteries. It therefore seems to be a direct sedative. According to the doctrine of the chemical physiologists, it is a powerful disoxygenizing remedy. It has only been used in diabetes by Dr Rollo and others, under the name of hepatized ammonia, in doses of five or ten drops twice or thrice a-day *.

* *Duncan's Dispensatory.*

242 Ammoniated oil.

g. OLEUM AMMONIATUM, E. LINIMENTUM AMMONIÆ, L. D. LINIMENTUM VOLATILE. Ammoniated oil. *Liniment of ammonia. Volatile liniment.*

Ammoniated oil is properly a soap, formed by combining a solution of ammonia, or of carbonate of ammonia, with olive oil. The Edinburgh college directs it to be prepared by mixing together two ounces of olive oil and two drams of water of ammonia. The London college has two preparations of this kind; a stronger, formed of one ounce of water of pure ammonia, mixed with two ounces of olive oil; and a weaker, of half an ounce of water of ammonia and one ounce and a half of oil.

This preparation is seldom kept ready made, as by standing it becomes thick, and is diminished in strength. It is of a light yellow colour.

Ammoniated oil is a useful external application in cases of cynanche and rheumatism, being either rubbed on the affected part, or applied to it spread on flannel, and changed occasionally.

243 Aromatic ammoniated alcohol.

h. ALCOHOL AMMONIATUM AROMATICUM, E. SPIRITUS AMMONIÆ COMPOSITUS, L. SPIRITUS ALKALI VOLATILIS AROMATICUS, D. Aromatic ammoniated alcohol. *Compound spirit of ammonia. Aromatic spirit of volatile alkali. Sal volatile.*

This is a composition of *ammoniated alcohol* with various aromatic oils. In the Edinburgh Pharmocopœia it is prepared by dissolving one dram and a half of oil of rosemary, and one dram of oil of lemon peel, in eight ounces of ammoniated alcohol: by the London college we are directed to prepare it of two pints of spirit of ammonia, and two drams of oil of lemon, and of oil of cloves; and by that of Dublin, of two pounds of spirit, and of oil of lemon and oil of nutmeg, each two drams.

It is of a light amber colour, and of a very fragrant smell. It is more palatable and less acrimonious than the other preparations of ammonia, and is well suited to spasmodic complaints, faintness, and weakness of the stomach. Dose from twenty drops to a dram.

244 Volatile liniment.

i. LINIMENTUM VOLATILE, D. Volatile Liniment *of the Dublin college.*

A compound of one part of the above preparation and two parts of the Dublin soap liniment, of which hereafter. A stimulating external application.

245 Succinated spirit of ammonia.

k. SPIRITUS AMMONIÆ SUCCINATUS, L. Succinated spirit of ammonia.

This

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This is prepared by dissolving a scruple of rectified oil of amber, and ten grains of soap, in an ounce weight of alcohol, and then adding four measured ounces of water of pure ammonia.

It is at first of a milky colour, but gradually becomes more or less transparent by standing. It is considered as much the same with the French *eau de luce*.

It is an useful antispasmodic, whether snuffed up the nose or rubbed on the temples.

246 Fetid ammoniated alcohol.

l. ALCOHOL AMMONIATUM FOETIDUM, E. SPIRITUS AMMONIÆ FŒTIDUS, L. SPIRITUS ALKALI VOLATILIS FOETIDUS, D. Fetid ammoniated alcohol. *Fetid spirit of volatile alkali.*

A solution of asafœtida in spirit of ammonia, which is prepared, according to the Edinburgh college, by digesting half an ounce of asafœtida in eight ounces of spirit of ammonia for 12 hours, and distilling off the spirit. The London college directs six pints of proof spirits, a pound of sal ammoniac, four ounces of asafœtida, and a pound and a half of potash, to be mixed together, and five pints to be distilled off with a slow fire.

An excellent antispasmodic, particularly suited to hysterical cases. Dose from 30 drops to a dram.

Particular Animal Substances.

CLASS MAMMALIA. Order GLIRES.

247 Castor.

3. CASTOR FIBER, E. The beaver. CASTOREUM, L. D. *Castor.*

This is a substance secreted in a follicle situated near the anus of the beaver, perhaps the inguinal gland. It is of a dark brown colour, friable, of a pungent bitter taste, and a very strong unpleasant smell. It is contained in a roundish or flatteued membranous bag. Bouillon la Grange has found by analysis, that it consists of mucilage, bitter extract, resin, a peculiar volatile oil, and a flaky crystalline substance resembling *adipocire*. Its volatile parts come over by distillation with water, and great part of the substance is soluble in alcohol.

The best castor comes from Russia, but a great deal is brought from Canada. The Russian castor is in larger rounder bags, and is of a much stronger smell than the Canadian.

Castor is one of our most established antispasmodics, and was much esteemed and extolled by Dr Cullen. It is chiefly prescribed in hysteria, but seldom alone or in substance. Dose from 10 to 30 grains in a bolus.

Officinal Preparations.

248 Tincture of castor.

a. TINCTURA CASTOREI. Tincture of castor.

The London and Dublin colleges direct two ounces of powdered Russian castor to be digested ten or seven days in two pints (London), or two pounds (Dublin), of proof spirit. According to the Edinburgh formula, an ounce and a half of Russian castor is to be digested for seven days in a pound of alcohol, and the tincture strained through paper.

This tincture is of a dark brown colour, and possesses all the valuable properties of the simple drug. Dose from 30 drops to a dram. It is sometimes used as an external application in ear-ach; equal parts of this and tincture of opium being dropped into the ear.

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249 Compound tincture of castor.

b. TINCTURA CASTOREI COMPOSITA, E. Compound tincture of castor.

This is prepared by digesting an ounce of powdered Russian castor, and half an ounce of asafœtida, in a pound of ammoniated alcohol, for seven days, filtering the liquor through paper.

A more powerful antispasmodic than the former; dose from 20 to 40 drops.

250 Musk.

4. MOSCHUS MOSCHIFERUS, E. The musk animal. MOSCHUS, L. D. Musk.

Musk is a resinous matter secreted in a receptacle situated near the navel of the musk animal. See MAMMALIA *Index.*

This substance is, when dry, of a reddish brown or rusty black colour, somewhat unctuous, and of a more or less granulated appearance: it has a bitterish and rather acrid taste; a fragrant smell, agreeable at a distance, but so strong as to be highly unpleasant when smelt near to. So violent indeed is the smell of musk, when fresh taken from the animal, or from quantities put up by the merchants for sale, that it has been known to force the blood from the nose, eyes, and ears, of those who have imprudently inhaled its vapours; and we are assured by Chardin, that whenever he engaged in the purchase of musk, he found it always necessary to cover his face with several folds of a handkerchief, in order to be sufficiently secure against the sudden effects of the smell.

As musk is an expensive drug, it is frequently adulterated by various substances: and we are assured that pieces of lead have been found in some of the receptacles, inserted in order to increase the weight. The most usual mode of adulterating it is by taking the musk from the bag, and mixing it with dried blood coarsely powdered. This may in general be detected by observing that the bag has been opened; by the fetid smell which the substance emits when heated, and by the smell of ammoniacal gas which is perceived when the adulterated musk is rubbed with potash.

This substance is particularly efficacious, and there is scarcely any substitute for it in particular cases. When properly administered it sometimes succeeds in the most desperate cases. It raises the pulse without producing much heat; it removes spasmodic affections, and is found to have considerable effect on the nervous system, increasing the powers of thought, sensation, and voluntary motion.

It may be employed in all cases of typhus fevers; in particular, where there is much delirium, subsultus tendinum, &c. It is also employed in febrile eruptions, and in many spasmodic diseases, as the chincough, epilepsy, tetanus, &c.

Officinal Preparations.

251 Tincture of musk.

a. TINCTURA MOSCHÆ, D. Tincture of musk.

This is prepared by macerating two drams of musk in a pound of rectified spirit of wine for seven days, and straining the liquor.

The tincture of musk may be given in doses of a dram

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dram or two. It is best mixed with honey or syrup, as the addition of water renders it turbid.

b. MISTURA MOSCHATA, L. Musk mixture.

252 Musk mixture.

This is directed by the London college to be made by rubbing two scruples of musk, first with one dram of double refined sugar, then with the addition of the same quantity of powdered gum arabic, and six ounces of rose water, added by degrees.

The musk must be well rubbed with the sugar and gum, before the rose water be added, otherwise a separation will take place. It is best to make this preparation only when required, as it does not keep well.

Musk mixture is given in most of the cases in which the simple drug is indicated. Dose, an ounce or an ounce and a half.

253 Hartshorn.

5. CERVUS ELAPHUS, E. the Stag. CORNU CERVINUM, L. D. *Hartshorn.*

The horn of the stag differs little from bone, except in containing more cartilage. It was formerly employed in the preparation of ammonia, whence that alkali was denominated *hartshorn*, and at present there are two or three modifications of ammonia that are directed to be prepared from this substance. It is also burnt to form pure phosphate of lime.

Officinal Preparations.

254 Phosphate of lime.

a. PHOSPHAS CALCIS, E. CORNU CERVI, VEL CERVINUM USTUM, L. D. Phosphate of lime. *Burnt hartshorn.*

The Edinburgh college directs this to be prepared by burning pieces of hartshorn till they become perfectly white, and then reducing them to a fine powder.

Burnt hartshorn was formerly given as an antacid; but its efficacy in that way appears to be trifling, as the phosphoric acid is not easily separated from the lime, and of course the latter will not neutralise the acid morbidly secreted in the alimentary canal. Of late pure phosphate of lime has been recommended as a remedy for rickets, with the view of supplying solid matter to the bones. Dose about ten grains.

255 Volatile liquor of hartshorn.

b. LIQUOR VOLATILIS CORNU CERVI, L. D. Volatile liquor of hartshorn. *Spirit of hartshorn.*

256 Salt of hartshorn.

c. SAL CORNU CERVI, L. D. *Salt of hartshorn.*

257 Oil of hartshorn.

d. OLEUM CORNU CERVI, L. D. *Oil of hartshorn.*

These are all made from one chemical operation. A quantity of hartshorn is put into a retort, and submitted to a heat that is gradually increased. First the volatile liquor comes over, then the salt, and lastly the oil. After the salt and oil are separated from the liquor, this is distilled again two or three times with a moderate heat, by which it is rendered more pure.

The salt is purified by mixing it with an equal weight of prepared chalk, and then subliming.

The volatile liquor and salt of hartshorn differ little from the water of carbonate of ammonia, and the solid carbonate, except in containing a quantity of empyreumatic oil. They are in fact less pure than the above-mentioned preparations of ammonia, and might be entirely set aside. They are chiefly used to smell to in cases of fainting or hysteria.

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These preparations may be made from the bones or horns of any animal, where hartshorn cannot be conveniently procured.

258 Animal oil.

c. OLEUM ANIMALE, L. OLEUM CORNU CERVINI RECTIFICATUM, D. Animal oil. *Rectified oil of hartshorn. Dippel's oil.*

This is made by distilling the oil of hartshorn that rises in the preceding operation, twice or three times, either by itself, or with the addition of water.

Animal oil was formerly much employed as a powerful antispasmodic. Dose 15—30 drops. When given six hours before the accession of a paroxysm of an intermitting fever, on an empty stomach, it is said to have kept off the paroxysm.

259 Mutton suet.

6. OVIS ARIES, E. the Sheep. SEVUM OVILLUM, L. D. *Mutton suet.*

Mutton suet is employed in the preparation of several ointments and cerates, which will be mentioned hereafter.

Order 6. BELLUÆ.

260 Hogs lard.

7. SUS SCROFA, E. the Hog. ADEPS SUILLUS, L. D. *Hogs lard.*

Used also in the preparation of liniments, ointments, &c. and sometimes employed alone as an external emollient.

Order 7. CETE.

261 Spermaceti.

8. PHYSETER MACROCEPHALUS, E. Spermaceti Whale. *Sperma Ceti*, L. D.

This is a white flakey substance, that is found in certain cells in the head of the spermaceti whale. See CETOLOGY, N° 66, and CHEMISTRY, N° 2860.

As an emollient, spermaceti is employed both internally and externally. Internally it is given in the form of emulsion mixed with mucilage or yolk of egg, or mixed with syrup into a linctus, in cases of catarrh, *ardor urinæ*, &c. As an external application, it enters into the composition of the following

Officinal Preparations.

262 Ointment of spermaceti.

a. UNGUENTUM SPERMATIS CETI, L. D. Spermaceti ointment.

This ointment is prepared by melting together six drams of spermaceti, two drams of white wax, and three ounces of olive oil, over a slow fire, stirring them constantly till they are cold.

263 Spermaceti cerate.

b. CERATUM SPERMATIS CETI, L. D. CERATUM SIMPLEX, E. Spermaceti cerate. *Simple Cerate. White Cerate.*

In the preparations of this cerate, the proportions of the Edinburgh pharmacopœia differ from those directed by the colleges of London and Dublin. The former orders six parts of olive oil, three of white wax, and one of spermaceti; the two latter, half an ounce of spermaceti, two ounces of white wax, and four ounces

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of oil. They are made in a similar manner with the ointment.

These preparations are used principally for dressing ulcers, or to form more compounded ointments or cerates.

CLASS II. BIRDS. Order 1. ANSERES.

264 Goose-grease.

9. ANAS ANSER, the goose. ADEPS ANSERINUS, D. Goose grease.

This fat is now rarely used in medicine, as it seems to possess no superior properties to hog's lard, which is more conveniently procured.

Order 2. GALLINÆ.

265 Egg.

10. PHASIANUS GALLUS, the domestic fowl. OVUM EJUSQUE PUTAMEN. *Egg, and egg-shells.*

The yolk of egg is employed in pharmacy for rendering oils and resins miscible in water. For this purpose it is scarcely preferable to common vegetable mucilage, and has the disadvantage of sooner becoming putrid, and the white is used in making *alum cataplasm*. Egg-shells prepared, i. e. levigated, are sometimes employed as an antacid, but they do not seem better in that respect than common carbonate of lime, or magnesia.

CLASS IV. FISHES. Order 6. CHONDROPTERYGII.

266 Isinglass.

11. ACCIPENSER HUSO, E. Isinglass fish. ICHTHYOCOLLA, L. D. *Isinglass.* See the article ICHTHYOCOLLA.

Employed as an emollient, and said to be the principal substance used in making *court plaster*.

CLASS V. INSECTS. Order 1. COLEOPTERA.

267 Cantharides.

12. LYTTA VESICATORIA. MELOE VESICATORIUS, E. CANTHARIS, L. D. Cantharides. *Spanish flies.*

For the natural history of this insect, see ENTOMOLOGY, p. 169; and for its chemical analysis, see CHEMISTRY, N° 2875.

Cantharides are stimulant and virulent to so great a degree, that their internal exhibition requires to be conducted with the utmost caution, otherwise inflammation in the stomach, intestines, or urinary passages, may be the consequence. When taken in considerable quantity, they produce inflammation and ulceration of the stomach and bowels, attended with mucous or purulent stools, fetid breath, violent pains in the belly; and these symptoms, if not timely relieved, are followed by faintness, giddiness, and death. Applied externally, they inflame and excoriate the skin, and if continued for a sufficient time, produce a large vesication, filled with acrid serum. Their external application is not unfrequently followed by distressing strangury.

Internally they have been exhibited as a diuretic in dropsical cases, in a dose from half a grain to a grain. They are frequently employed in weakness of the urinary organs: in incontinence of urine proceeding from paralysis vesicæ, in gleets, fluor albus, diabetes, and other diseases of the urinary passages, originating in, or connected with debility. Not only in the incontinency of urine which accompanies a palsy of the lower extremities, but also in that which is occasioned by an over-distention of the bladder, these flies have been administered internally with evident relief. The same beneficial effects have followed their use in ischuria vesicalis, or suppression of urine from over-distension of the bladder. They are recommended as an excellent remedy in gleets by *Mead* and *Werlhof*, and the last-mentioned physician prescribed them in cases of hydrophobia.

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The internal use of cantharides in gleets and leucorrhœa has of late been much extended by Dr John Robertson; but for an account of the circumstances which led him to such a free use of this medicine, and for his mode of exhibiting it, we must refer to his late work on the subject, and a paper published by him in the second volume of the Edinburgh Medical Journal.

When these stimulants are administered internally, they are prescribed either in powder or in tincture. The dose in substance (which is the most certain form of internal exhibition) is from half a grain to one or two grains every sixth hour, made into pills. Of the tincture, the dose is from 10 to 30 drops. During the use of either, the patient should be directed to drink of mucilaginous decoctions, emulsions, &c. Camphor is thought by some practitioners to moderate the too stimulating action of cantharides, and is accordingly combined with them or their tinctures whenever they are given internally. Others join nitre with them, as well as camphor.

Of the external use of cantharides by way of blister, we shall speak presently under the preparations that are employed for that purpose.

Officinal Preparations.

268 Tincture of cantharides.

a. TINCTURA MELOES VESICATORII, E. TINCTURA CANTHARIDIS, L. T. CANTHARIDUM, D. Tincture of cantharides.

The Edinburgh tincture is directed to be made, by digesting for seven days a dram of powdered cantharides in a pound of diluted alcohol; and that of the Dublin college is prepared with the same proportions. The London tincture is made by digesting two drams of bruised cantharides, and half a pound of powdered cochineal, in a pint and a half of proof spirit for eight days.

These tinctures differ a little in point of strength. When given internally, the dose of the Edinburgh or Dublin tincture may be from 20 to 30 drops; that of the London tincture from 10 to 20 drops. They are employed externally as a *rubefacient* in cases of palsy, angina, gastritis, &c.

269 Cerate of cantharides.

b. CERATUM CANTHARIDIS, L. D. Cerate of cantharides.

This cerate is prepared by mixing a dram, or four scruples, of powdered cantharides, with six drams, or an ounce, of spermaceti cerate.

It is chiefly employed to promote the running of issues.

270 Plaster of cantharides.

c. EMPLASTRUM MELOES VESICATORII, E. EMPLASTRUM CANTHARIDIS, L. EMP. CANTHARIDUM, D. Plaster of cantharides. *Blistering plaster.*

According to the Edinburgh college, this plaster is

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to be prepared by first melting together equal weights of mutton suet, yellow wax, and white rosin; and when these are removed from the fire, sprinkling in an equal proportion of powdered cantharides. The proportions of the London and Dublin colleges are 1 pound of finely powdered cantharides, 2 pounds of wax plaster, and half a pound of hog's lard, and the ingredients are mixed in a similar manner.

271 Compound plaster of cantharides.

d. EMPLASTRUM MELOES VESICATORII COMPOSITUM, E. Compound plaster of cantharides.

This is made of Burgundy pitch, Venice turpentine, cantharides, each 12 parts; yellow wax, 4 parts; subacetate of copper, 2 parts; mustard seed and black pepper, each 1 part. Having first melted the pitch and wax, the turpentine is to be added, and while these ingredients are still fluid, the other articles in fine powder are to be mixed with them, and the whole constantly stirred till cold.

This last-mentioned plaster of Spanish flies is too compound, and being of a corrosive quality, is rarely prescribed. The other more simple forms of cantharides plaster are in frequent use for exciting vesications in various acute and chronic diseases, particularly in internal inflammations and pains, as well as in many spasmodic affections. Blistering has been recommended by some physicians in the advanced and sinking stage of typhus fever; but the propriety of such a practice is extremely questionable. We would further remark, that in the febrile disorders of children, a good deal of caution is requisite in the application of blisters; a spreading erythematous inflammation, and even gangrene, being sometimes the consequence. In some of the above-mentioned disorders much benefit is obtained by keeping the blistered part open, or in an ulcerated state for a considerable length of time. This is done by any of the following ointments.

272 Ointment of cantharides.

e. UNGUENTUM CANTHARIDIS, L. UNG. CANTHARIDUM, D. Ointment of cantharides.

This is prepared by taking pulverized Spanish flies, two ounces; distilled water, eight ounces; ointment of yellow resin, eight ounces. The Spanish flies being boiled in the water, this is reduced to half the original quantity, the liquor is strained, and the ointment of yellow resin added. The mixture is then placed in a water bath, saturated with sea salt, and evaporated to the consistence of an ointment.

273 Ointment of infusion of cantharides.

f. UNGUENTUM INFUSI MELOES VESICATORII, E. Ointment of infusion of cantharides.

To prepare this ointment, the Edinburgh college directs one part of cantharides to be macerated for a night in four parts of boiling water; the exprest and strained liquor to be boiled with two parts of hogs lard till the water is evaporated, then one part of yellow wax, and the same proportion of white rosin to be added; and when the whole is melted, and removed from the fire, two parts of Venice turpentine are to be mixed with it, and the whole stirred till cold.

274 Ointment of cantharides powder.

g. UNGUENTUM PULVERIS MELOES VESICATORII, E. Ointment of cantharides powder.

This is prepared by mixing together seven parts of resinous ointment, and one part of powdered cantharides.

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All these ointments, besides being used for keeping open blisters, are occasionally employed for issue ointments.

For more on the subject of blisters, the reader is referred to Percival's Essays, vol. i. and Withers on the use and abuse of Medicines.

Order 2. HEMIPTERA.

275 Cochineal.

13. COCCUS CACTI, E. COCCINELLA, L. D. Cochineal. See ENTOMOLOGY *Index*.

This is employed in medicine merely as a colouring matter.

Order 5. HYMENOPTERA.

APIS MELLIFICA. The bee.

276 Honey.

14. MEL. *Honey.*

Besides being used as an article of diet, honey is often employed medicinally, either for the preparation of electuaries, or for making a kind of syrups, called *oxymels* or *medicated honeys*. It generally proves gently laxative, but is apt to disagree with the stomach, producing sickness and griping. It might probably be entirely superseded by sugar, which is not attended with those unpleasant effects.

Officinal Preparations.

277 Clarified honey.

a. MEL DESPUMATUM. Clarified honey.

For the purpose of clarifying honey, the colleges of London and Dublin direct that it should be melted in a water bath, removing the scum as it rises.

In this way the honey is rendered more beautiful to the eye, but is scarcely less liable to disagree with weak stomachs.

278 Acetated honey.

b. MEL ACETATUM, L. OXYMEL SIMPLEX. Acetated honey. *Simple oxymel.*

Two pounds of clarified honey are boiled in a glass vessel over a gentle fire, with one pound of distilled vinegar, till they are reduced to the consistence of a syrup.

This is a useful remedy, diluted with water and employed as a gargle, in coughs and sore throats.

Order 7. APTERA.

279 Millepedes.

15. ONISCUS ASELLUS, E. MILLEPEDA, L. D. Millepedes or *Woodlice.*

Formerly employed as a diuretic in the form of pills, that were made either of the living animals, or of these killed by spirit of wine and powdered.

280 Crabs eyes.

16. CANCER ASTACUS, E. The craw-fish. *Cancrorum lapilli. Crabs eyes.* See CHEMISTRY, N° 2882.

Officinal Preparation.

281 Prepared crabs eyes.

a. CANCRORUM LAPILLI PRÆPARATI, E. Prepared crabs eyes.

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Formerly much employed as an antacid, though not at all superior to common carbonate of lime.

17. CANCER PAGURUS, E. The black-clawed crab. CHELÆ CANCRORUM, L. *Crabs claws.*

282 Crabs claws.

Officinal Preparations.

283 Prepared crabs claws.

a. CHELÆ CANCRORUM PRÆPARATÆ, L. Prepared crabs claws.

Reduced to powder like the former, by levigation, diffusion, filtration, and drying. Of similar properties.

284 Compound powder of crabs claws.

b. PULVIS CHELARUM CANCRI COMPOSITUS, L. Compound powder of crabs claws.

A mixture of one pound of prepared crabs claws, with three ounces of prepared chalk, and the same proportion of prepared red coral.

CLASS VI. WORMS. Order 2. MOLLUSCA.

285 Leeches.

18. HIRUDO MEDICINALIS. Medicinal leech. See HELMINTHOLOGY *Index.*

Order 3. TESTACEA.

286 Oyster shells.

19. OSTREA EDULIS, E. OSTREA, L. D. Oyster. See CONCHOLOGY *Index.* TESTÆ OSTREARUM. *Oyster shells.* See CHEMISTRY, N° 2883.

Officinal Preparation.

287 Prepared oyster shells.

a. OSTREARUM TESTÆ PRÆPARATÆ, L. Prepared oyster shells.

Prepared in the same way as crabs claws, possessing similar properties.

Order 4. ZOOPHYTA.

288 Red coral.

20. GORGONIA NOBILIS. ISIS NOBILIS, E. CORALLIUM RUBRUM, L. D. Red coral. See CHEMISTRY, N° 2886.

Officinal Preparation.

289 Prepared red coral.

a. CORALLIUM RUBRUM PRÆPARATUM. Prepared red coral.

As above.

290 Sponge.

21. SPONGIA OFFICINALIS, E. SPONGIA, L. D. Sponge. See HELMINTHOLOGY *Index.*

In its natural state, sponge is employed by surgeons, for cleansing wounds and ulcers, for making tents, and for stopping hemorrhagies from small divided blood vessels.

Officinal Preparation.

291 Burnt sponge.

a. SPONGIA USTA, L. D. Burnt sponge.

Sponge is burnt in a close iron vessel, after being cut into small pieces and bruised to free it from earthy and stony matter. The burning is continued till the sponge becomes black and friable, and it is then reduced to a fine powder.

Burnt sponge has been long employed as a remedy in scrophulous affections. It seems to owe its beneficial operation (mostly slight and uncertain) in these disorders, partly to its alkaline and partly to its carbonaceous nature. Perhaps the first-mentioned may contribute to the solution and diffusion (in the human body) of its coaly matter. It is given (made into a bolus, or lozenge) in doses of a scruple, or half a dram, twice a-day. History of Simple and Officinal Medicines.

It is likewise said to be a remedy for the bronchocele, in which cases it has been administered with success in the following manner. The stomach and bowels having been duly cleansed by a vomit and purge taken two days before, the patient, on going to bed, is to place a bolus consisting of half a dram of burnt sponge, and as much honey as is necessary, in the mouth, under the tongue, and as it gradually dissolves to swallow it. This bolus is to be repeated for six nights. A bitter powder made of five grains of chamomile flowers, gentian root, and the lesser centaury tops, is to be taken every seventh day during the use of the bolus, and on the eighth day the purge is to be repeated. Others have employed sponge in these cases in the form of a lozenge, which is certainly more conveniently held in the mouth than a bolus *.

* *Thesaurus Medicaminum.*

CHAP. II. *Vegetable Substances.*

SECT. I. *Vegetable products that are procured from plants in general, or from such as are imperfectly known.*

292 Charcoal.

22. CARBO LIGNI, E. Charcoal. See CHEMISTRY *Index.*

For medical purposes charcoal should be fresh burned, or should be kept carefully excluded from the air. Its chief use is as an antiseptic, correcting putridity; hence it is employed as a tooth-powder, either alone or mixed with astringents and aromatics, and is sometimes given internally in diarrhœa and dysentery, where the matters evacuated are very offensive. It is also said to act as a gentle laxative.

293 Wood soot.

23. FULIGO LIGNI COMBUSTI. Wood soot.

This differs from charcoal in containing a considerable quantity of empyreumatic oil, to which the properties attributed to it as an antispasmodic are to be ascribed. It is now seldom used.

294 Common alcohol.

24. ALCOHOL, E. SPIRITUS VINOSUS RECTIFICATUS, L. SPIRITUS VINI RECTIFICATUS, D. Alcohol. *Rectified spirit of wine.*

For the usual preparation, history, and chemical properties of alcohol, see CHEMISTRY, Chap. xi. sect. i.

The only certain mode of ascertaining the purity of alcohol and its preparations is by taking their specific gravity, for the manner of doing which see HYDRODYNAMICS. The specific gravity of rectified spirit should be 835.

Alcohol is one of the most violent stimuli with which we are acquainted. Applied externally it corrugates the solid parts of the body, and coagulates all the albuminous and gelatinous fluids with which it comes in contact. By violently contracting the smaller vessels, it checks

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checks passive hemorrhagies, and by destroying the sensibility of the extremities of nerves it alleviates pain, and in some cases removes spasm. Taken undiluted into the stomach, it acts in a similar manner, contracting the solids and destroying nervous sensibility. If the quantity is considerable, it brings on apoplexy and palsy, followed by death. Sufficiently diluted alcohol acts as a tonic and gentle stimulus, exhilarating the spirits, increasing the appetite, and promoting digestion; but a too frequent use of ardent spirits is attended with dangerous consequences. See N° 102. It is a useful application to recent burns and scalds, preventing vesication.

It must be remarked, that what the Edinburgh college have called alcohol is not pure alcohol.

Officinal Preparations.

295 Pure alcohol.

a. ALCOHOL, L. D. Alcohol.

The process for obtaining pure alcohol given by the London college is somewhat different from that of the Dublin college. The former directs a gallon of rectified spirit of wine to be mixed with an ounce of pure kali, and afterwards a pound of hot prepared kali to be added. The mixture is to be well shaken and set by for 24 hours, when the spirit is to be poured off, mixed with half a pound *more* prepared kali, and distilled in a water bath. The distilled alcohol should have the specific gravity of 815.

The process of the Dublin pharmacopœia is as follows. Five pounds of rectified spirit are mixed with one ounce of caustic vegetable alkali, and then with one pound of pearl ashes dried over the fire and still warm. This mixture is digested for three days, shaking it frequently; and then the spirit is poured off, and distilled till three pounds have come over. The Dublin alcohol has the specific gravity of 820, and is consequently weaker than that of the London pharmacopœia.

Pure alcohol is not employed in medicine, and therefore the college of Edinburgh have given no formula for its preparation.

296 Vitriolic ethereal liquor.

b. LIQUOR ÆTHEREUS VITRIOLICUS, D. Vitriolic ethereal liquor.

This is prepared by putting 32 ounces of rectified spirit of wine into a retort that is capable of supporting a sudden heat, and pouring on it in a continued stream 32 ounces of sulphuric acid, mixing them gradually; then placing the retort in heated sand, and distilling off 16 ounces into a cool receiver, taking care so to regulate the heat that the mixture may boil as soon as possible. The specific gravity should be about 753.

In a similar manner is prepared the

297 Spirit of vitriolic ether.

SPIRITUS ÆTHERIS VITRIOLICI, L. Spirit of vitriolic ether.

This preparation is an impure ether, and, when purified, as directed below, it forms the officinal *sulphuric ether*.

It is employed as a stimulant in low fevers and febrile eruptions. Dose from 60 to 100 drops.

298 Sulphuric ether.

c. ÆTHER SULPHURICUS, E. ÆTHER VITRIOLICUS, L. D. Sulphuric ether. *Vitriolic ether.*

The colleges of London and Dublin direct their sulphuric ether to be prepared by rectifying the former preparation by means of potash. According to the former, two pounds of spirit of vitriolic ether are to be mixed with one measured ounce of water of pure kali, and the mixture distilled with a gentle heat, till 14 measured ounces have come over. In the Dublin formula 16 ounces of vitriolic ethereal liquor are mixed with two drams of powdered caustic vegetable alkali; and 10 ounces are distilled off.

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The Edinburgh college direct 32 ounces of alcohol, and the same quantity of sulphuric acid, to be mixed together in a proper retort, and 16 ounces to be distilled over from a sand heat suddenly applied. To the distilled liquor are then to be added two drachms of potash, and from a very high retort 10 ounces are to be distilled with a gentle fire.

On the chemical nature and properties of sulphuric ether, see CHEMISTRY, Chap. XI. Sect. II. Its specific gravity should be about 739.

The medical uses of ether are thus described by Dr Duncan. "As a medicine taken internally, it is an excellent antispasmodic, cordial, and stimulant. In catarrhal and asthmatic complaints, its vapour is inhaled with advantage, by holding in the mouth a piece of sugar, on which ether has been dropt. It is given as a cordial in nausea, and in febrile diseases of the typhoid type, as an antispasmodic in hysteria, and in other spasmodic and painful diseases; and as a stimulus in soporose and apoplectic affections. Regular practitioners seldom give so much as half an ounce, much more frequently only a few drops, for a dose; but empirics have sometimes ventured upon much larger quantities, and with incredible benefit. When applied externally, it is capable of producing two very opposite effects, according to its management; for if it be prevented from evaporating, by covering the place to which it is applied closely with the hand, it proves a powerful stimulant and rubefacient, and excites a sensation of burning heat. In this way it is frequently used for removing pains in the head or teeth. On the contrary, if it be dropt on any part of the body exposed freely to the contact of the air, its rapid evaporation produces an intense degree of cold; and this is attended with a proportional diminution of bulk in the part to which it is applied: in this way it has frequently facilitated the reduction of strangulated hernia *." * *Duncan's Dispensatory.*

299 Sulphuric ether with alcohol.

d. ÆTHER SULPHURICUS CUM ALCOHOLE, E. Sulphuric ether with alcohol.

This is prepared by mixing together one part of sulphuric ether, and two parts of alcohol. In nature and properties, it agrees with the *spiritus ætheris vitriolici* of the London Pharmacopœia.

c. OLEUM VINI, L. Oil of wine.

300 Oil of wine.

This preparation is made by mixing together one part of alcohol, and the same quantity of sulphuric acid, and distilling, taking care that no black froth pass into the receiver. The oily part of the distilled liquor is to be separated from the volatile acid; and to the former is to be added as much water and pure kali, as is sufficient to correct the sulphureous smell. Then a gentle heat is to be applied to distil off the little ether that

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that the liquor contains; and the oil that floats on the remaining fluid is to be separated and preserved for use.

This is employed chiefly as an ingredient in the following preparation; though it is sometimes given alone as a stimulus, in a dose from 10 to 20 drops.

301 Compound spirit of vitriolic ether.

f. SPIRITUS ÆTHERIS VITRIOLICI COMPOSITUS, L. Compound spirit of vitriolic ether.

Prepared by mixing two pounds of spirit of vitriolic ether, and three drams of the oil of wine.

It is employed as an antispasmodic in similar cases, and doses, as sulphuric ether.

302 Oily ethereal liquor.

g. LIQUOR ÆTHEREUS OLEOSUS, D. LIQUOR HOFFMANNI ANODYNUS. Oily ethereal liquor. *Hoffman's anodyne liquor.*

Made by distilling to one half the liquor that remains after preparing the Dublin vitriolic ether.

Similar in its properties to ether, but weaker. It is much the same as the former.

303 Aromatic sulphuric ether with alcohol.

h. ÆTHER SULPHURICUS CUM ALCOHOLE AROMATICUS, E. Aromatic sulphuric ether with alcohol.

This is prepared by digesting, for seven days, an ounce of bruised cinnamon, an ounce of bruised lesser cardamom seeds, and two drams of powdered long pepper, in two pounds and a half of sulphuric ether with alcohol.

A powerful stimulant and tonic. Dose 30 drops to a dram.

304 Diluted alcohol.

25. ALCOHOL DILUTUM, E. SPIRITUS VINOSUS TENUIOR, L. SPIRITUS VINI TENUIOR, D. Diluted alcohol. *Weaker spirit of wine. Proof spirit.*

This is rectified spirit lowered with water to what is called *proof strength*, having a specific gravity of about 935. In all its essential properties it resembles common spirits, and either whisky or British spirit may be used for it. The proof spirit of commerce is usually distilled either from molasses or grain.

In pharmacy it is employed as a menstruum for making various tinctures.

305 Common acetous acid.

26. ACIDUM ACETOSUM IMPURUM. ACETUM VINI, D. ACETUM, L. Impure acetous acid. *Vinegar.*

As the vinegar commonly met with is made from other fermented liquors besides the juice of the grape, we have inserted it here among the vegetable principles. On the production and properties of vinegar, see CHEMISTRY, N° 649 and 2310. Common vinegar, besides diluted acetous acid, contains tartaric acid, tartrate of potash, supertartrate of potash, and mucilage. It should be transparent, of a pale yellow colour, fragrant pungent smell, and an agreeable sharp taste. It is seldom employed in medicine before it is purified by distillation or other processes to be immediately mentioned. Vinegar is a good family remedy as a refrigerant in fevers, as a stimulant external application in bruises, sprains, &c. and vinegar whey made by coagulating warm milk by means of good vinegar, is one of the best auxiliary diaphoretics with which we are acquainted.

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306 Distilled acetous acid.

a. ACIDUM ACETOSUM DESTILLATUM, E. ACETUM DISTILLATUM, L. D.

The Edinburgh college directs eight pounds of common acetous acid to be distilled in a glass vessel with a gentle heat, setting aside the first two pounds that come over, and preserving the next four pounds. The Dublin college directs 10 pounds of vinegar to be put into the still, and six pounds to be drawn off at once; and the London college, from five pounds, directs that there should be distilled off as much as comes over free from empyruma.

Distilled vinegar is freed from the salts and mucilage contained in common vinegar, and therefore is purer and keeps better; but it is much weaker than good vinegar. If it has been distilled in glass vessels it can have acquired no metallic impregnation; but it is sometimes, as well as common vinegar, adulterated with sulphuric acid to make it appear stronger. This fraud may be detected by adding *muriate of baryta*, which will produce a white precipitate if sulphuric acid be present.

It is employed for gargles, for preparing various *acetates*, and other officinal medicines. It is also given as a refrigerant diluted with water in feverish disorders, and is applied externally.

307 Strong acetous acid.

b. ACIDUM ACETOSUM FORTE, E. ACIDUM ACETOSUM, L. Strong acetous acid. *Radical vinegar. Acetic acid.*

By the Edinburgh process, a pound of dried sulphate of iron is to be rubbed with 10 ounces of acetate of lead; the mixture is then to be put into a retort, and distilled as long as any acid comes over. The London college directs two pounds of coarsely-powdered verdigris, well dried by means of a water bath, saturated with sea salt, to be put into a retort and distilled, repeating the distillation with the liquor that comes over.

On the production and properties of this acid, see CHEMISTRY, N° 652, *et seq.* Its specific gravity should be about 1060. It is sometimes contaminated with sulphurous acid or with lead. The former may be discovered by the unpleasant tickling cough it then occasions when snuffed up the nose; and the latter by adding sulphuret of ammonia, by which, if lead be present, the liquor will be tinged of a dark brown.

This preparation is employed chiefly as a stimulant to be snuffed up the nose in syncope, hysteria, and similar affections: externally it acts as a rubefacient. Both this and the two following may be used as fumigations to correct the bad smell of sick rooms.

308 Aromatic vinegar.

c. ACETUM AROMATICUM, E. Aromatic vinegar. *Vinegar of the four thieves.*

Made by macerating four ounces of dried rosemary tops, four ounces of dried sage leaves, two ounces of dried lavender flowers, and two drams of cloves, in eight pounds of distilled acetous acid for seven days, and straining.

Sometimes given as a stimulus, diluted with water in typhus.

d. ACIDUM

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d. ACIDUM ACETOSUM CAMPHORATUM, E. Camphorated acetous acid.

309 Camphorated acetous acid.

Prepared by dissolving half an ounce of camphor, reduced to powder by being rubbed with alcohol, in six ounces of strong acetous acid.

This should be kept in glass phials with ground stoppers. It is an excellent stimulus for snuffing up the nostrils.

310 Syrup of acetous acid.

c. SYRUPUS ACIDI ACETOSI, E. Syrup of acetous acid.

This is prepared by boiling together two pounds and a half of acetous acid (*common vinegar*), and three pounds and a half of double refined sugar.

Used in the same cases as acetated honey, (see N° 277.) to which it is preferable.

311 Acetate of potash.

f. ACETAS POTASSÆ, E. KALI ACETATUM, L. ALKALI VEGETABILE ACETATUM, D. SAL DIURETICUS. Acetate of potash. *Acetated kali. Acetated vegetable alkali. Diuretic salt.*

This salt is made by boiling any quantity of subcarbonate of potash with distilled acetous acid, first using about five times its weight, and, during the boiling, gradually adding more till all effervescence ceases, slowly evaporating to dryness, fusing the dry salt, then dissolving it in water, and slowly evaporating the solution till there remains a dry white saline mass, which is to be kept well stopt from the air, in which it deliquesces. See CHEMISTRY, N° 987.

Acetate of potash is employed as a diuretic in a dose of from one to four scruples, and in a dilute solution as a refrigerant in fevers, &c.

312 Impure subcarbonate of potash.

27. SUBCARBONAS POTASSÆ IMPURUS. CARBONAS POTASSÆ IMPURUS, E. CINERES CLAVELLATI, L. ALKALI FIXUM VEGETABILE, D. Impure subcarbonate of potash. *Potashes. Pearl ashes. Fixed vegetable alkali.*

For the production and nature of this alkaline substance, see CHEMISTRY, Chap. XII. Sect. I. It is seldom employed in pharmacy, except as the basis of some *officinal preparations.*

313 Subcarbonate of potash.

a. SUBCARBONAS POTASSÆ. CARBONAS POTASSÆ, E. KALI PRÆPARATUM, L. ALKALI VEGETABILE MITE, D. Subcarbonate of potash. *Carbonate of potash. Prepared kali. Mild vegetable alkali.*

This is usually prepared from the former substance, which is purified by burning it in a crucible, then dissolving it in water, filtering and evaporating to dryness in a clean iron pot, stirring the mass as it dries, to prevent its coalescing into one cake.

This salt appears in small white grains of scarcely any perceptible smell, but of a hot alkaline taste. When pure, it should dissolve entirely in cold water, and should deliquesce in moist air into a limpid transparent fluid.

As usually made, it contains a considerable proportion of sulphate of potash, which may be separated from it by mixing it with its own weight of water, and allowing it to stand till cold, when most of the sulphate of potash is separated in crystals.

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This alkaline carbonate is employed as a diuretic, mixed with infusion of chamomile and spirit of juniper, in a dose of about a scruple repeated occasionally; and as an antacid. It is also employed in combination with citric acid, to relieve nausea and check vomiting.

314 Water of prepared kali.

b. AQUA KALI PRÆPARATI, L. LIXIVIUM MITE, D. Water of prepared kali. *Mild ley.*

This is made by allowing subcarbonate of potash to deliquesce in a moist atmosphere, and straining it; or, by dissolving it in an equal weight of water.

It possesses the same properties as the dry carbonate, and is employed chiefly for decomposing other salts.

315 Water of carbonate of potash.

c. AQUA CARBONATIS POTASSÆ. AQUA SUPERCARBONATIS POTASSÆ, E. LIQUOR ALKALI VEGETABILIS MITISSIMI, D. Water of carbonate of potash. *Solution of mildest vegetable alkali.*

This is properly a neutral salt, and is prepared by dissolving subcarbonate of potash in water, and saturating it with carbonic acid, by passing through it a stream of this gas, arising from the decomposition of carbonate of lime, by diluted sulphuric acid.

On the nature of this salt, see CHEMISTRY, N° 109, 174.

By this means the alkaline carbonate is better adapted for internal use, as it is rendered not only more pleasant to the taste, but is less apt to offend the stomach. Indeed it is the only form in which we can exhibit potash in sufficient doses, and for a sufficient length of time, to derive much benefit from its use in calculous complaints. It has certainly been frequently of advantage in these affections, but probably only in those instances in which the stone consists of uric acid, or urate of ammonia; for though supersaturated with carbonic acid, yet the affinity of that acid for potash is so weak, that it really operates as an alkali.

Six or eight ounces may be taken two or three times a-day. It in general proves powerfully diuretic, and sometimes produces inebriation. This last effect is ascribed to the carbonic acid.

316 Water of potash.

d. AQUA POTASSÆ, E. AQUA KALI PURI, L. LIXIVIUM CAUSTICUM, D. Water of potash. *Water of pure kali. Caustic ley.*

The following is the Edinburgh process for obtaining a solution of pure potash.

Take of newly prepared lime, eight ounces; carbonate of potash, six ounces. Put the lime into an iron or earthen vessel, with 28 ounces of warm water. After the ebullition is finished, instantly add the salt, and having thoroughly mixed them, cover the vessel till they cool. When the mixture has cooled, agitate it well, and pour it into a glass funnel, whose throat must be obstructed with a piece of clean linen. Cover the upper orifice of the funnel, and insert its tube into another glass vessel, so that the water of potash may gradually drop through the rag into the lower vessel. As

soon

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soon as it ceases to drop, pour into the funnel some ounces of water, but cautiously, so that it may swim above the matter. The water of potash will again begin to drop, and the affusion of water is to be repeated in the same manner, until three pounds have dropped, which will happen in the space of two or three days; then mix the superior and inferior parts of the liquor together by agitation, and keep it in a well-stopped phial.

From this process those of the London and Dublin colleges do not materially differ. For other methods of procuring pure potash, see CHEMISTRY, N° 905, *et seq.*

This preparation was formerly much employed in calculous disorders. From 10 to 40 drops were given in gruel, milk, or broth, twice or thrice a-day; but even in these doses it has often proved highly injurious, when long continued, to the organs of digestion. Hence it has been justly superseded by the solution of carbonate of potash above mentioned.

317 Potash.

e. POTASSA, E. KALI PURUM, L. ALKALI VEGETABILE CAUSTICUM, D. LAPIS INFERNALIS. Potash. *Pure kali. Caustic vegetable alkali. Common stronger caustic.*

This is made by evaporating any quantity of the solution of potash in a very clean covered iron vessel, till on the ebullition ceasing, the saline matter flows like oil, which happens before the vessel becomes red. The mass is then to be poured out on a smooth iron plate, till it be divided into small pieces before it hardens, when it must be deposited in a well-stopt phial.

This has been long employed by surgeons as a caustic; but its use in this way is inconvenient, as from its rapid deliquescence it is not easily confined.

318 Potash with lime.

f. POTASSA CUM CALCE, E. CALX CUM KALI PURO, L. CAUSTICUM MITIUS, D. Potash with lime. *Lime with pure kali. Milder caustic.*

Made by evaporating in a covered iron vessel any quantity of solution of potash till it is reduced to a third, and then gradually adding as much newly slaked or powdered lime as is sufficient to form a thick mass, which is to be kept in a closely stopped vessel. This is employed as a caustic, and is milder in its operation, and more manageable than the last.

319 Bees wax.

28. CERA. Bees wax.

Though wax is generally obtained from honey-combs, we have here introduced it as a vegetable principle, since modern chemistry has shown that it may be obtained by certain processes from most vegetables. See CHEMISTRY, N° 2432.

Two varieties of wax are employed in medicine, *cera flava*, yellow wax, which is the wax as it is naturally procured from the comb, and *cera alba*, white wax, bleached by art. They do not differ in their sensible properties, and the white wax is only preferable to the yellow, from its making ointments, &c. of a more delicate colour.

Wax is seldom employed internally, though it is sometimes administered as an emollient by way of emulsion in diarrhœa and dysentery. It is used chiefly for preparing ointments, liniments, and cerates.

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a. LINIMENTUM SIMPLEX, E. Simple liniment. 320 Simple liniment.

Made by melting together one part of white wax, and four of olive oil.

b. UNGUENTUM SIMPLEX, E. Simple ointment. 321 Simple ointment.

This differs from the last, only in its proportions, being composed of two parts of white wax, and four of olive oil.

c. UNGUENTUM CEREUM, L. D. Wax ointment. 322 Wax ointment.

Made by melting together four ounces of white wax, three ounces of spermaceti, and a pint of olive oil.

d. EMPLASTRUM SIMPLEX, E. EMPLASTRUM CERÆ, D. EMPLASTRUM CERÆ COMPOSITUM. L. Simple plaster. *Wax plaster. Compound wax plaster.* 323 Simple plaster.

The Edinburgh preparation is composed of three parts of yellow wax, and of mutton suet and white rosin each two parts; that of the London and Dublin colleges is formed from yellow wax and mutton suet, each three pounds, and yellow rosin one pound.

29. AMMONIACUM. Gum ammoniac. 324 Ammoniacum.

This is a common concrete, gummy, resinous juice from the East Indies, generally in large masses, composed of little lumps or tears, of a milky whiteness: the external parts of the mass are commonly yellowish or brownish, and the white tears change to the same colour on being exposed for some time to the air. Of the plant from which it is extracted, we have no further knowledge, than what is learnt from the seeds found among the tears, which resemble those of dill, except that they are larger, and apparently belong to a plant of the umbelliferous kind.

Ammoniacum has a strong smell, and a nauseous sweetish taste, which is followed by a bitter one. It is frequently made use of in asthmas, in menstrual suppressions, and cachectic indispositions. In obstructions of the breast it is accounted the most effectual of the aperient gums: in hysteric cases, some of the others are preferred or joined to it, on account, chiefly, of their more powerful smell. It is most commodiously taken in the form of pills; the dose is a scruple or half a dram every night or oftener; in larger does, as a dram, it generally lossens the belly. Applied externally, it is supposed to discuss hard indolent tumours.

Officinal Preparations.

a. AMMONIACUM PURIFICATUM. Purified gum ammoniac. 325 Purified gum ammoniac.

Ammoniacum is purified by melting it in hot water, squeezing it through linen, and evaporating to a proper consistence.

b. LAC AMMONIACI, L. D. Emulsion of gum ammonia. 326 Emulsion of gum ammoniac.

Made by triturating two drams of ammoniac with half a pint of distilled water till an emulsion is formed.

Given in most cases where ammoniac is used as an expectorant. Dose an ounce or two, repeated occasionally.

c. EMPLASTRUM

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c. EMPLASTRUM GUMMOSUM, E. Gum plaster.

Made by melting together eight parts of plaster of semivitrified oxide of lead, one part of gum ammoniac, and the same proportion of galbanum and yellow wax.

Employed to form adhesive plasters.

327 Myrrh.

30 MYRRHA. Myrrh.

Myrrh is a gum resin brought from the East Indies, or from Abyssinia. The best myrrh is in the form of tears. It should be of a yellow, or reddish yellow colour, becoming redder when breathed on, light, brittle, of an unctuous feel, pellucid, shining, presenting white semicircular striæ in its fracture; of a very bitter aromatic taste, and a strong, peculiar, not unpleasant odour. It is not good if whitish, dark coloured, black, resinous, ill smelled, or mixed with impurities, which is too commonly the case.

Neumann ascertained that water and alcohol are both of them capable of taking up the whole of the taste and smell of the myrrh, the extract made by either after the other being insipid. The alcohol distilled from the tincture elevated none of the flavour of the myrrh; but during the inspissation of the decoction a volatile oil arose, containing the whole of the flavour of the myrrh, and heavier than water, while the extract was merely bitter. From 7680 parts of myrrh he got 6000 watery extract, 180 volatile oil, and 720 alcoholic; and inversely, 2400 alcoholic, and 4200 watery. Dr Duncan junior has observed that the tincture is transparent, and when poured into water, forms a yellow opaque fluid, but lets fall no precipitate, while the watery solution is always yellow and opaque; and that myrrh is not fusible, and is difficultly inflammable. Mr Hatchett found it soluble in alkalies.

Myrrh is a heating stimulating medicine. It frequently occasions a mild diaphoresis, and promotes the fluid secretions in general. Hence it proves serviceable in cachectic diseases, arising from inactivity of the system, and is supposed to act especially upon the uterine system, and to resist putrefaction.

It is exhibited in substance; in the form of powder, or made up into pills, in doses of 10 to 60 grains; dissolved in water, as in Griffith's famous, but unchemical, myrrh mixture; and dissolved in alcohol *.

* *Duncan's Dispensatory.*

Officinal Preparations.

328 Tincture of myrrh.

a. TINCTURA MYRRHÆ. Tincture of myrrh.

This tincture is made by digesting three ounces of powdered myrrh in about 20 ounces of alcohol, mixed with 10 ounces of water, according to the Edinburgh process; half a pint of alcohol, with a pint and a half of proof spirit, according to the London college; or two pounds of alcohol according to that of Dublin, for seven or eight days.

Tincture of myrrh is seldom given internally, its principal use being as an external application, either as a gargle, or as a lotion for cleansing foul ulcers, and promoting the exfoliation of carious bones.

329 Compound powder of myrrh.

b. PULVIS MYRRHÆ COMPOSITUS, L. Compound powder of myrrh.

Made by rubbing together into a powder equal parts of myrrh, dried savine, dried rue, and Russian castor.

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Given as a stimulus in uterine obstructions. Dose from a scruple to a dram several times in the day.

330 Sagapenum.

31. SAGAPENUM. See CHEMISTRY, N° 2495.

Sagapenum is employed as a stimulant and antispasmodic, chiefly in combination with other gum resins, to be mentioned hereafter.

331 Angustura.

32. ANGUSTURA. CORTEX ANGUSTURÆ. Augustura bark.

This bark was some years ago introduced into this country from the West Indies. It is not certainly known of what tree it is the produce, but it is probable that it is a species of cinchona. It is thus described by Mr Brande. "There is a considerable variety in the external appearance of the angustura bark, owing, however, probably, to its having been taken from trees of different sizes and ages, or from various parts of the same tree, as the taste and other properties perfectly agree. Some parcels (says Mr Brande), which I have examined, consist chiefly of slips torn from branches which could not have exceeded the thickness of a finger. These are often smooth, three feet or more in length, and rolled up into small bundles. In others, the pieces have evidently been, for the greater part, taken from the trunk of a large tree, and are nearly flat, with quills of all sizes intermixed.

"The outer surface of the angustura bark, when good, is in general more or less wrinkled, and covered with a coat of a grayish-white, below which it is brown, with a yellow cast: the inner surface is of a dull brownish-yellow colour. It breaks short and resinous. The smell is singular and unpleasant, but not very powerful; the taste intensely bitter, and slightly aromatic; in some degree resembling bitter almonds, but very lasting, and leaving a sense of heat and pungency in the throat. This bark, when powdered, is not unlike the powder of Indian rhubarb. It burns pretty freely, but without any particular smell *."

* See *Brande on the Angustura Bark.*

It is employed as a tonic, generally in substance; dose from 15 to 30 grains. It may also be given in the form of infusion, decoction, tincture, or extract. It is well adapted to cases of debility of the alimentary canal.

332 Columbo root.

33. COLOMBA. RADIX COLOMBÆ. Columbo root.

This root is brought from Columbo, a town in the island of Ceylon, to which it was originally transplanted from the continent of India. It is called by the Portuguese *Raijs de Mosambique*. We are as yet unacquainted with the vegetable of which it is a part.

Columbo root comes to us in circular pieces, which are from half an inch to three inches in diameter, and from two inches to a quarter of an inch in length. The sides are covered with a thick wrinkled bark, of a dark brown colour externally, but of a light colour within. The surfaces of the transverse sections appear very unequal, highest at the edges, with a concavity towards the centre. On paring off this rough surface, the root is seen to consist of three laminæ, the cortical, ligneous, and medullary. This last is much the softest, and, when chewed, seems very mucilaginous. A number of small fibres run longitudinally through it, and appear

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on the surface. The cortical and ligneous parts are divided by a circular black line. All the thicker pieces have small holes drilled through them, for the convenience of drying.

This root has an aromatic smell, but is disagreeably bitter and pungent to the taste, resembling mustard seed long kept.

This is an excellent bitter tonic, useful in debilities of the stomach and intestinal canal, in bilious diarhœas, in bilious fevers, in which it sometimes agrees when Peruvian bark fails; in the nausea and vomiting attending pregnancy. It is usually given in substance, in a dose from 15 grains to half a dram, or by way of infusion.

Officinal Preparation.

333 Tincture of columbo.

TINCTURA COLOMBÆ, E. L. Tincture of Columbo.

The Edinburgh college direct this tincture to be made, by digesting for eight days two ounces of columbo root in two pounds of diluted alcohol. The London tincture is stronger than this, being made with two ounces and a half of the root to two pints of proof spirit. This tincture may be given in a dose of a dram or two.

For some valuable observations on the nature and use of columbo root, see *Percival's Essays*, vol. ii.

SECT. II. *Medicinal Vegetables, arranged according to the System of Linnæus.*

CLASS I. MONANDRIA. Order 1. MONOGYNIA.

334 Round zedoary.

34. KÆMPFERIA ROTUNDA. ZEDOARIA, L. Round zedoary root.

This is a spicy root brought from the East Indies, in pieces about an inch long, rather rough on the surface, and commonly terminating in a point. It is seldom employed except as an ingredient in an aromatic electuary to be afterwards mentioned.

335 Turmeric root.

35. CURCUMA LONGA. CURCUMA, L. Turmeric root.

This is brought from the East Indies, where it is employed as a spice. The roots are tuberous, long, knotty, and wrinkled; of a pale yellow colour externally, and a shining saffron brown within; of a weak aromatic smell, and a warm, slightly bitter taste.

Seldom employed in this country as a remedy, but much used in the composition of curry powder.

336 Ginger.

36. AMOMUM ZINGIBER, E. ZINGIBER, L. D. Ginger root. See BOTANY, p. 76.

This is the least acrimonious of all the foreign aromatics. It may be taken in considerable quantities, either with food or as a medicine. It as an excellent stimulant, peculiarly suited to the constitutions of those whose stomachs are subject to flatulency, atonic gout, and other disorders marked by want of energy in the organs of digestion. In these cases it may be given either by itself, or combined with bitters and other tonics. It is also joined with antacids. It is a common and useful addition to cathartic medicines, particularly to infusions and tinctures of the vegetable cathartics, serving to moderate their irritating action on the bowels. The pulverized root may be given in doses from 10 to 30 grains. It has sometimes been used with advantage as a masticatory in strumous affections of the tonsils. It is often prescribed in the form of a watery infusion, made by steeping two ounces of the bruised root in one pint of boiling water. A small wine-glass-full of such an infusion, taken warm three or four times a day, has afforded great relief in many cases of gouty dyspepsia.

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Officinal Preparations.

337 Tincture of ginger.

a. TINCTURA ZINGIBERIS, L. Tincture of ginger.

This is made by digesting two ounces of powdered ginger in two pounds of proof spirit for eight days. It may be given in a dose of two or three drams, mixed with water.

338 Syrup of ginger.

b. SYRUPUS AMOMI ZINGIBERIS, E. SYRUPUS ZINGIBERIS, L. Syrup of ginger.

The Edinburgh syrup is made by macerating three ounces of beaten ginger in four pounds of boiling water for 24 hours in a covered vessel, and then forming the syrup by adding seven pounds and a half of double refined sugar. The syrup of the London college is made with four ounces of bruised ginger to three pints of boiling distilled water, adding a sufficient quantity of double refined sugar to make a syrup.

A useful addition to stimulating mixtures, and employed in pharmacy as a constituent in several electuaries and pills.

339 Long zedoary.

37. AMOMUM ZEDOARIA, D. Long zedoary root.

A spicy root brought from the East Indies, especially from Ceylon, much resembling the kæmpferia in properties, but rather stronger.

340 Lesser cardamom seeds.

38. AMOMUM CARDAMOMUM. AMOMUM REPENS, E. CARDAMOMUM MINUS, L. D. Lesser cardamom seeds.

It is uncertain whether these seeds are the produce of the *amomum cardamomum* or *repens*. They are brought from the East Indies, and form a very grateful aromatic, frequently employed in practice as a stimulant. They are brought to us in little whitish, roundish, triangular, pointed pods. The seeds are of a dark brown colour, of a fragrant smell, and pungent, rather saltish taste. The husks are separated from the rest by beating them in a mortar.

Officinal Preparations.

341 Tincture of cardamom seeds.

a. TINCTURA AMOMI REPENTIS, E. TINCTURA CARDAMOMI, L. D. Tincture of cardamom seeds.

The Edinburgh tincture is made by digesting for seven days, four ounces of bruised cardamom seeds in two pounds and a half of diluted alcohol. In the London formula, three ounces of the seeds are digested for eight days in two pints of proof spirit. Dose two or three drams.

342 Compound tincture of cardamom seeds.

b. TINCTURA CARDAMOMI COMPOSITA, L. D. Compound tincture of cardamom seeds.

Made by digesting two drams of lesser cardamom seeds powdered, the same quantity of powdered caraway

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raway seeds (and in the London formula, of cochineal) half an ounce of bruised cinnamon, and four ounces of stoned raisins, in two pints, (or according to the Dublin college, two pounds), of proof spirit for 14 days.

A very grateful aromatic tincture, sometimes given alone as a cordial, in a dose of three or four drams, but more commonly added to stimulant draughts and juleps, to which it gives a fine rich colour.

343 Galangal root.

39. MARANTA GALANGA. GALANGA. Galangal root.

Sometimes employed as a warm aromatic, in a dose of about a scruple.

CLASS II. DIANDRIA. Order 1. MONOGYNIA.

344 Olive oil.

40. OLEA EUROPÆA, E. OLIVA, L. D. The olive tree. OLEUM OLIVÆ. Olive oil.

Pure olive oil should have a fine rich greenish yellow colour, with scarcely any perceptible taste or smell; should be perfectly transparent, and should congeal at about 38° of Fahrenheit. It is brought to us from the south of France, from Italy, and the Levant. The best is supposed to come from Florence.

Olive oil is chiefly employed as an emollient, both externally and internally. Internally it is sometimes employed as a gentle laxative, and to moderate the action of acrid substances, especially poisons. It has been given as an anthelmintic, either alone or formed into an emulsion with ammonia.

345 Hedge hyssop.

41. GRATIOLA OFFICINALIS, E. GRATIOLA, L. Hedge hyssop.

This plant, when dried, is sometimes employed as a drastic purgative and anthelmintic, given in substance, in a dose of from 20 to 30 grains, or by way of infusion, to the extent of 3 drams. Its use requires caution.

346 Rosemary.

42. ROSMARINUS OFFICINALIS, E, ROSMARINUS, L. D. Rosemary.

The tops of rosemary are used as a stimulant, and form an ingredient in some tinctures. Rosemary owes its stimulating powers to its essential oil, which is very similar to camphor.

Officinal Preparations.

347 Volatile oil of rosemary.

a. OLEUM VOLATILE RORISMARINI OFFICINALIS, E. OLEUM RORISMARINI, L. Volatile oil of rosemary.

This oil, like most of the other volatile oils of aromatic plants, is obtained by distilling the plant with a sufficient quantity of water to prevent burning, and separating the oil that floats on the surface of the distilled liquor, by means of a funnel with a long capillary tube.

Oil of rosemary is seldom employed alone, but it may be given in a dose of a few drops as a stimulant.

348 Spirit of rosemary.

b. SPIRITUS RORISMARINI OFFICINALIS, E. SPIRITUS RORISMARINI, L. Spirit of rosemary.

Made by distilling 2 pounds, or, according to the London college, a pound and a half, of rosemary tops, with a gallon of diluted alcohol, and a sufficient quantity of water to prevent burning, distilling off a gallon.

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Chiefly employed to form some compound tinctures, or as an external stimulant, in which way it is commonly used under the name of *Hungary water*.

349 Sage.

43. SALVIA OFFICINALIS, E. SALVIA, L. D. Sage leaves.

An infusion of sage leaves is sometimes employed as a refreshing drink in fevers, and has been recommended as a tonic in nervous debilities and dyspepsia. It forms a good substitute for Chinese tea.

350 Brooklime.

44. VERONICA BECABUNGA. BECABUNGA, L. D. Brooklime. See BOTANY, p. 84.

A common succulent plant that has been recommended as an excellent antiscorbutic.

Order 3. TRIGYNIA.

351 Black pepper.

45. PIPER NIGRUM. Black pepper.

This is brought from the East Indies, being cultivated chiefly in Java and Malabar. White pepper is the same fruit, with the black bark taken off.

Pepper is one of the most heating spices, and is said sometimes to act violently on the kidneys, so as when taken in large quantities to excite nephritis. It is not unfrequently given internally as a stimulant, especially in the form of powder. A few grains of white pepper swallowed whole, are recommended by some practitioners, as a remedy in the debility of the digestive organs.

352 Cubebs.

46. PIPER CUBEBA. CUBEBA, L. Cubebs.

These are scarcely to be distinguished by the eye from common pepper, except in being furnished with a long slender stalk. They are brought from Java. In stimulating properties they resemble pepper, but are much weaker, and are seldom used.

353 Long pepper.

47. PIPER LONGUM. Long pepper.

Long pepper appears in small round grains, disposed spirally in a long cylindrical head. It is extremely pungent, and has a kind of saltish taste. It is employed chiefly as an ingredient in an aromatic electuary and tincture.

CLASS III. TRIANDRIA. Order 1. MONOGYNIA.

354 Valerian root.

48. VALERIANA OFFICINALIS, E. VALERIANA SYLVESTRIS, L. D. Valerian root.

This root consists of a number of strings or fibres, of a pale brownish colour, proceeding from a common stock, and matted together. It has a very strong unpleasant smell, and a warm, bitterish, acrid taste. It imparts its smell to water distilled from it, and most of its properties may be imparted to alcohol. Valerian grows commonly in Britain, and the best is that which grows in high, dry situations. The roots should be taken up in autumn or winter.

Valerian is a valuable antispasmodic, and is properly ranked among the most powerful of that class of remedies. It has been found efficacious in epilepsy, in which it should be given in substance, in large doses, to the

History of Simple and Officinal Medicines.

extent of a dram or two several times a-day. It is useful in hysteria, and in cases of great nervous sensibility. It is sometimes united with cinchona in the form of an electuary. The usual dose is from 15 to 30 grains. Its unpleasant flavour is most effectually concealed by the addition of a little mace.

Officinal Preparations.

355 Tincture of valerian.

a. TINCTURA VALERIANI, L. Tincture of valerian.

This is made by digesting four ounces of valerian root in coarse powder in two pints of proof spirit for eight days, with a gentle heat.

This tincture is given in the same cases in which valerian is useful in substance, in a dose of from two to four drams; but it is not so efficacious as the powder, or the following tincture.

b. TINCTURA VALERIANI AMMONIATA, L. D. Ammoniated tincture of valerian.

Made by digesting for eight days, in a closely covered vessel, four ounces of powdered valerian root in two pints of compound spirit of ammonia.

This is perhaps the best form in which valerian can be given, as its antispasmodic virtues are much improved by the addition of ammonia. Dose a dram or two, which is best taken in water a little warmed.

356 Resinous extract of wild valerian.

c. EXTRACTUM VALERIANI SYLVESTRIS RESINOSUM, D. Resinous extract of wild valerian.

This extract is made by digesting for four days a pound of powdered valerian in four pounds of rectified spirit of wine; then pouring off the tincture, and boiling the residuum in 12 pounds of water to two pounds. The two liquors are to be strained separately; the decoction is to be boiled, and the tincture distilled, till both are sufficiently thick, and they are then to be mixed together.

Of the effects of this extract we have had no experience; but we believe an extract made by inspissating the ammoniated tincture, has been given with success in the form of pills.

357 Saffron.

49. CROCUS SATIVUS, E. CROCUS, L. D. Saffron.

Saffron is made from the stigmata of the above species of the crocus, which is cultivated for that purpose in some parts of England, especially in Essex. Saffron is also brought from abroad, but that of our own produce is considered as the best. See BOTANY, p. 100.

Officinal Preparations.

358 Syrup of saffron.

a. SYRUPUS CROCI, L. Syrup of saffron.

This is made by infusing an ounce of saffron in a pint of boiling distilled water for 12 hours, and boiling the strained infusion with a sufficient quantity of double refined sugar to form a syrup.

Syrup of saffron is chiefly used as a pleasant addition to draughts and juleps, to which it imparts a fine yellow colour.

359 Tincture of saffron.

b. TINCTURA CROCI, E. Tincture of saffron.

Made by digesting an ounce of English saffron cut into shreds, in 15 ounces of diluted alcohol for seven days, and straining the tincture.

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By some practitioners this is considered as a good remedy in chronic weakness, and is given in the dose of a table spoonful undiluted, every morning.

360 Florentine orris.

50. IRIS FLORENTINA, E. IRIS, L. Florentine orris.

This is brought from Italy in white, flattish, knotty pieces, that are very difficult to break or powder. It has an agreeable fragrant smell, and a slightly bitter taste. It is employed chiefly as a perfume.

361 Water flag.

51. IRIS PSEUDACORUS. IRIS, D. Water flag. See BOTANY, p. 100.

Order 2. DIGYNIA.

362 Sugar.

52. SACCHARUM OFFICINARUM. Sugar. SACCHARUM NON PURIFICATUM, E. L. SACCHARUM RUBRUM, D. Brown sugar. SACCHARUM PURIFICATUM, L. D. SACCHARUM PURISSIMUM, E. Refined sugar.

363 Refined sugar.

On the chemical properties of sugar, see CHEMISTRY. Brown sugar is sometimes employed as a gentle laxative, especially in clysters. Refined sugar is used chiefly in making syrups and conserves, and in giving an agreeable taste.

Officinal Preparation.

364 Simple syrup.

a. SYRUPUS SIMPLEX, E. Simple syrup.

Made by dissolving 15 parts of double refined sugar in 8 of water, by a gentle heat.

365 Oats.

53. AVENA SATIVA, E. AVENA, L. Oats.

Oats are employed in medicine chiefly to form gruel, which is made either from groats or oatmeal, and is an useful diluent in febrile and inflammatory affections, and is also used in clysters as an emollient. Poultices are sometimes made of oatmeal, mixed with other substances according to the nature of the case.

366 Common wheat.

54. TRITICUM { ÆSTIVUM, D. / HIBERNUM, L. } Common wheat. FARINA. *Flour.* AMYLUM. *Starch.*

367 Starch.

Flour and starch are sometimes used as emollients, especially the latter, in the form of clysters or troches, in cases of diarrhœa, dysentery, &c.

Officinal Preparations.

368 Mucilage of starch.

a. MUCILAGO AMYLI, E. L. Mucilage of starch.

Made by triturating half an ounce of starch with one pound of water, and then boiling the liquor till it be sufficiently thick.

369 Troches of starch.

b. TROCHISCI AMYLI, L. Troches of starch.

Composed of an ounce and a half of starch, six drams of extract of liquorice, half an ounce of powdered Florentine orris root, and one pound and a half of double refined sugar, made into a mass for troches, with mucilage of gum tragacanth.

These troches are employed as demulcents, to allay the irritation of tickling coughs.

55. HORDEUM

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55. HORDEUM DISTICHON, E. D. HORDEUM, L. Common barley.

Common barley freed from the husks, and formed into what is called *pearl barley*, is used in medicine as an emollient in the form of decoction, or barley water.

370 Common barley.

Officinal Preparations.

371 Decoction of barley.

a. DECOCTUM HORDEI DISTICHI, E. DECOCTUM HORDEI, L. Decoction of barley.

The making of barley water requires more nicety than is usually supposed. The following is the method directed in the Edinburgh Pharmacopœia.

Take of pearl barley two ounces; water five pounds. First wash off the mealy part which adheres to the barley with some cold water; then extract the colouring matter by boiling it a little with about half a pound of water. Throw this decoction away, and put the barley thus purified into five pounds of boiling water, which is to be boiled down to one-half, and strain the decoction.

372 Compound decoction of barley.

b. DECOCTUM HORDEI COMPOSITUM, L. Compound decoction of barley.

Made by boiling two pints of the decoction of barley, two ounces of sliced figs, half an ounce of liquorice root sliced and bruised, two ounces of stoned raisins, in one pint of distilled water, boiled to two pints and strained.

These decoctions may be used as common drink, in pneumonia, and similar affections of the breast.

CLASS IV. TETRANDRIA. Order 1. MONOGYNIA.

373 Sarcocol.

56. PENÆA SARCOCOLLA. SARCOCOLLA, L. Sarcocol. See CHEMISTRY, N° 2493.

374 Madder root.

57. RUBIA TINCTORUM, E. RUBIA, L. D. Madder root.

This root has been long reputed a specific in uterine obstructions, but we believe without any good foundation. It is recommended in the atrophy of children, given in substance, in doses of a scruple or half a dram several times a-day. Its property of tinging the bones of animals has been already mentioned.

375 Contrayerva.

58. DORSTENIA CONTRAJERVA, E. CONTRAYERVA, L. Contrayerva root.

The root of this plant is knotty, an inch or two long, about half an inch thick, of a reddish brown colour externally, and pale within. From all sides of it there shoot out long, rough, slender fibres, generally loaded with knots. It has a peculiar kind of aromatic smell, and its taste is somewhat astringent and bitterish, with a light sweetish kind of acrimony, when chewed for a considerable time. The fibres have little or no taste or smell, therefore the tuberous parts alone should be chosen.

This plant is perennial, and grows in South America and some of the Caribbee islands.

Contrayerva has been employed as a stimulant diaphoretic, in typhus fever, given in substance, in a dose of from 30 to 40 grains; and a decoction of it, used as a gargle, has been recommended in putrid sore throat.

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Officinal Preparation.

376 Compound powder of contrayerva.

a. PULVIS CONTRAYERVÆ COMPOSITUS, L. Compound powder of contrayerva.

This is made by mixing together five ounces of powdered contrayerva, and one pound and a half of powder of crabs claws. Dose about a dram, repeated every three or four hours.

CLASS V. PENTANDRIA. Order 1. MONOGYNIA.

377 Alkanet root.

59. ANCHUSA TINCTORIA, E. ANCHUSA, D. Alkanet root.

This root is employed merely to give colour to an ointment.

378 Carolina pink root.

60. SPIGELIA MARYLANDICA, E. SPIGELIA, L. D. Carolina pink root.

From 10 to 20 grains of the root of this plant have been given twice a-day to children between 2 and 12 years of age, when troubled with worms. It generally operates as a purgative; but when it does not produce this effect in a sufficient degree, proper doses of rhubarb, jalap, or calomel, should be given with it. As the spigelia may be easily overdosed, and in that case produces alarming symptoms, it should perhaps be erased from the catalogue of vermifuge medicines, of which there is a sufficient number without it, that are at least equally efficacious, and much safer in their operation.

379 Marsh trefoil.

61. MENYANTHES TRIFOLIATA, E. TRIFOLIUM PALUDOSUM, L. D. Marsh trefoil.

This plant operates by purging and vomiting, in a dose of a dram. It has been recommended in fevers and intermittents, but is seldom employed.

380 Scammony.

62. CONVOLVULUS SCAMMONIA, E. SCAMMONIUM, L. D. Scammony.

This is a gum resin which is brought from Syria, Mysia, and Cappadocia. The roots of this plant, which are very long and thick, when fresh contain a milky juice. To obtain this, the earth is removed from the upper part of the roots, and the tops of these are cut obliquely off. The milky juice which flows out, is collected in a small vessel sunk in the earth at the lower end of the cut. Each root furnishes only a few drams, but it is collected from several vessels, and dried in the sun. This is the true and unadulterated scammony. It is light, of a dark gray colour, but becomes of a whitish yellow when touched with the wet finger, is shining in its fracture; has a peculiar nauseous smell, and bitter acrid taste, and forms with water a greenish milky fluid, without any remarkable sediment. In this state of purity it seldom reaches us, but is commonly mixed with the expressed juice of the root, and even of the stalks and leaves, and often with flour, sand, or earth. The best to be met with in the shops comes from Aleppo, in light spongy masses, having a heavy disagreeable smell; friable, and easily powdered; of a shining ash colour, verging to black; when powdered

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of a light gray or whitish colour. An inferior sort is brought from Smyrna in more compact ponderous pieces, not so friable, with less smell, and less easily powdered, of a darker colour, not so resinous, and full of sand and other impurities*. See CHEMISTRY, N° 2488.

* *Dr Duncan's Dispensatory.*

Scammony is one of the most drastic purgatives, and as such is sometimes given in dropsy, in a dose of from 5 to 15 grains. It is also one of the most common anthelmintics; but in this latter case is generally combined with a mercurial.

Officinal Preparations.

381 Compound powder of scammony.

a. PULVIS SCAMMONIÆ COMPOSITUS, L. E. D. Compound powder of scammony.

The London powder is composed of scammony, hard extract of jalap, of each two ounces; ginger, half an ounce: powdered separately, and then mixed together.

This powder in the Edinburgh Pharmacopœia is directed to be composed of scammony, supertartrite of potash, equal parts, rubbed together to a fine powder. The Dublin formula directs of scammony and vitriolated vegetable alkali, each two ounces, and ginger half an ounce, powdered separately, and then mixed together.

As the strength of these powders is different, their doses must vary: from 10 to 30 grains of the Edinburgh powder, and from 8 to 15 of the others, may be given for a dose.

382 Compound powder of scammony with aloes.

b. PULVIS SCAMMONII COMPOSITUS CUM ALOE, L. Compound powder of scammony with aloes.

This is composed of six drams of scammony, hard extract of jalap, socotorine aloes, of each one ounce and a half, of ginger half an ounce, powdered serately and mixed together.

Dose from 5 to 15 grains.

383 Powder of scammony with calomel.

c. PULVIS SCAMMONII CUM CALOMELANE, L. Powder of scammony with calomel.

This is composed of scammony half an ounce, calomel, double refined sugar, of each two drams, powdered separately and then mixed together.

This is well suited to cases of worms, and may be given from 12 to 20 grains.

384 Electuary of scammony.

d. ELECTUARIUM SCAMMONII, L. D. Electuary of scammony.

Prepared of an ounce and a half of powdered scammony, cloves, ginger, of each six drams, essential oil of caraway half a dram, and syrup of roses or orange peel, a sufficient quantity to form an electuary.

A brisk warm purgative, dose from 15 to 30 grains.

385 Jalap.

63. CONVOLVULUS JALAPA, E. JALAPIUM, L. JALAPA, D. Jalap root.

The botanical and medical history of this simple has been already sufficiently detailed under the article BOTANY, p. 132. It remains here only to notice the

Officinal Preparations.

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a. PULVIS JALAPÆ COMPOSITUS, E. Compound powder of jalap. 386 Compound powder of jalap.

This is prepared by grinding together one part of powdered jalap and two parts of supertartrate of potash into a fine powder.

The supertartrate of potash in this preparation is useful chiefly for assisting in reducing the jalap to a finer powder, and thus rendering its operation milder. Dose from half a dram to one dram.

387 Extract of jalap.

b. EXTRACTUM CONVOLVULI JALAPÆ, E. EXTRACTUM JALAPII, L. EXTRACTUM JALAPÆ, D. Extract of jalap.

This extract, according to the Edinburgh process, is made by digesting one pound of powdered jalap in four pounds of alcohol for four days, pouring off the liquor, and boiling the residuum for 15 minutes in five pounds of distilled water, filtering the decoction while boiling hot through linen. This decoction is to be repeated with the same quantity of water, and both decoctions, when filtered, are to be boiled to the consistency of honey. In the mean time the spirit is to be drawn off from the tincture by distillation, till this also becomes thick, when it is to be mixed with the watery extract, and both evaporated in a bath of boiling water saturated with muriate of soda, till there is formed a mass of a proper consistence for making pills.

This extract is a powerful purgative; it may be given in a dose of from 5 to 15 grains.

388 Tincture of jalap.

c. TINCTURA CONVOLVULI JALAPÆ, E. TINCTURA JALAPII, L. TINCTURA JALAPÆ, D. Tincture of Jalap.

This tincture is made by digesting three ounces (according to the Edinburgh college) or eight ounces according to the colleges of London and Dublin, of powdered jalap, in 15 ounces (or two pints London, or two pounds Dublin), of diluted alcohol, for seven or eight days, and straining the liquor through paper.

The dose of the Edinburgh tincture may be from three to six drams; that of the others from two to four drams.

389 Thorn apple.

64. DATURA STRAMONIUM, E. STRAMONIUM. Thorn apple. See BOTANY, p. 137.

390 Black henbane.

65. HYOSCYAMUS NIGER, E. HYOSCYAMUS, D. Black henbane.

This plant grows commonly on dunghills and uncultivated places in several parts of Britain. It produces large, dark-coloured, woolly, jagged leaves, of a very strong and peculiar smell, sparkling when burnt, as if impregnated with nitre. These leaves are the principal part employed in medicine, acting as a narcotic. The seeds are also employed, and when smoked like tobacco, are said to be an excellent remedy in toothach.

Wherever an anodyne is wanted, and opium disagrees, this herb, and the preparations from it, may be prescribed. It is especially suited to spasmodic and colic affections, and to cases of chronic rheumatism and arthritis.

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arthritis. Instances are also recorded of its beneficial effects in mania and melancholy; but in the last mentioned disorders, it has at least as often failed as it has succeeded, and is, on the whole, a doubtful remedy in diseases belonging to the order of vesaniæ. It does not occasion costiveness like opium, and forms one of the best substitutes for this expensive narcotic. Given in large doses, it produces great debility, delirium, remarkable dilatation of the pupils of the eyes, convulsions, and death. It is usually given in the form of extract, but the leaves are sometimes applied fresh by way of cataplasm to schirrous tumours and cancerous ulcers.

Officinal Preparations.

391 Inspissated juice of henbane.

a. SUCCUS SPISSATUS HYOSCYAMI NIGRI, E. Inspissated juice of henbane.

This is made by bruising the fresh leaves, and putting them into a hempen bag, in which they are strongly compressed till the juice is extracted. This is evaporated in flat vessels heated with boiling water, saturated with muriate of soda, till it becomes of the consistence of thick honey; and after the mass has become cold, it is put into glazed earthen vessels sprinkled with alcohol, and closely covered.

Dose from two grains to 15 or 20, on extraordinary occasions; but if these large doses occasion unpleasant effects, as headach, vertigo, vomiting, or purging, the medicine must be discontinued.

392 Tincture of henbane.

b TINCTURA HYOSCYAMI NIGRI, E. Tincture of henbane.

Made by digesting one ounce of the dried leaves of henbane in eight ounces of diluted alcohol for seven days, and straining. Dose from half a dram to a dram.

393 Tobacco leaves.

66. NICOTIANA TABACUM, E. NICOTIANA, L. D. Tobacco leaves. See BOTANY, p. 137.

Besides its ordinary narcotic virtues, the smoke of tobacco thrown up the bowels by way of clyster, has proved an effectual remedy in obstinate colic.

Officinal Preparations.

394 Tobacco wine.

a. VINUM NICOTIANÆ TABACI, E. Tobacco wine.

Made by macerating one ounce of the dried leaves of tobacco in one pound of Spanish white wine for seven days, and straining the liquor.

This has been sometimes employed as a diuretic. Dose from 30 to 60 drops.

395 Lesser centaury.

67. CHIRONIA CENTAURIUM, E. CENTAURIUM MINUS, L. D. Lesser centaury.

A strong bitter, sometimes employed as a tonic in the form of an infusion of the tops.

396 Nux vomica.

68. STRYCHNOS NUX VOMICA. Nux vomica. The kernel.

The taste of this kernel is extremely bitter; it has little or no smell, and is so hard, that it cannot be reduced into powder by beating.

This nut is a very powerful narcotic, inducing even death by its sedative powder, as, on dissection, no marks of inflammation, or local affection, are to be discovered in the stomach.

As a narcotic, it has scarcely been used, though it has been recommended in mania, epilepsy, hysteria, &c. It has been given in dysentery and intermittent fever, in a dose of five grains twice a day; but it does not possess any superior medicinal powers *.

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* *Murray's Elements*, vol. i.

69. CAPSICUM ANNUUM, E. PIPER INDICUM, L. D. Capsicum. Indian or Cayenne pepper. See BOTANY, p. 138.

397 Cayenne pepper.

It has been given with manifest advantage in cases of gouty dyspepsia, in some hydropic affections joined with paralytic symptoms, and in the advanced and sinking stage of typhus and the malignant endemic fever of the West Indies; also in the malignant sore throat, in which it has a good effect, both when taken into the stomach, and when used as a gargle. Bergius relates, that he prescribed the seeds with success in obstinate agues. Of the dried and pulverized capsules, the dose, internally, is from one to three grains. In the advanced stage of the yellow fever, double the last mentioned quantity has been given at a time. The gargle is prepared by macerating the powder first in warm vinegar, and afterwards adding a proper quantity of hot water, and continuing the maceration for a sufficient length of time. The proportions, two drams of the capsicum to half a pound of each menstruum *.

* *Practical Synopsis*, vol. ii.

70. SOLANUM DULCAMARA. DULCAMARA, D. Bitter sweet. See BOTANY, p. 138.

398 Bitter sweet.

71. ATROPA BELLADONNA. E. BELLADONNA, D. Deadly nightshade. See BOTANY, p. 138.

399 Deadly nightshade.

The whole plant is poisonous, and the berries, from their beautiful appearance, have sometimes proved fatal to children. The symptoms excited are, a dryness of the mouth, a trembling of the tongue, a very distressing thirst, a difficulty of swallowing, fruitless efforts to vomit, and great anxiety about the præcordia. Delirium then comes on, with gnashing of the teeth, and convulsions. The pupil remains dilated, and is not sensible even to the stimulus of light. The face becomes tumid, and of a dark red colour. The jaws are frequently locked. Inflammation attacks the œsophagus, stomach, and intestines, sometimes extending to the mesentery, lungs, and liver, accompanied with violent pains in the abdomen. The stomach is very insensible to stimulus, and the peristaltic motion of the intestines is destroyed. General relaxation, palsy, especially of the lower extremities, convulsions, vertigo, blindness, coma, and death succeed. The body soon putrifies, swells, and becomes marked with livid spots; blood flows from the nose, mouth, and ears, and the stench is insufferable. On dissection the blood is found to be fluid, the intestines are inflated and inflamed, or eroded and gangrenous. The best method of cure is to excite vomiting as soon as possible, by emetics, and tickling the fauces; to evacuate the bowels by purgatives and clysters, and to give largely, vinegar, honey, milk, and oil. In some children who recovered by this treatment, the delirium was succeeded by a profound sopor, accompanied with subsultus tendinum; the face and hands became pale and cold, and the pulse small hard, and quick. Their recovery was slow, and the blindness continued a considerable time, but at last went off †.

† *Duncan's Dispensatory.*

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A medicine capable of producing such powerful effects, demands the utmost caution on the part of the prescriber. He should begin with the smallest doses, increasing them very gradually to a double, triple, or quadruple quantity (in which cases the intervals between the repetitions of the doses should be proportionably lengthened) and desisting as soon as dryness or stricture of the throat, or much diarrhœa, or great languor, with sickness and vomiting, or vertigo, and dimness of sight, come on.

It is best employed in substance, beginning with a grain for adults, and an eighth or a fourth of a grain for children.

It has been employed in a great variety of cases, as, 1. In several febrile diseases; in obstinate intermittents; and in the plague. 2. In inflammations; the gout. 3. In comatose diseases; in palsy, and loss of speech from apoplexy. 4. In spasmodic diseases; in chorea, epilepsy, chincough, hydrophobia, melancholy, and mania. 5. In cachectic affections; in dropsies, and obstinate jaundice. 6. In local diseases; in amaurosis, ophthalmia, in schirrhus, and cancer.

Officinal Preparations.

400 Inspissated juice of deadly nightshade.

a. Succus spissatus Atropæ Belladonnæ, E. Inspissated juice of deadly nightshade.

This is made in the same way as the inspissated juice of henbane. See N° 391. Dose from one to five grains.

401 Cinchona bark.

72. Cinchona officinalis, E. CINCHONA, L. CORTEX PERUVIANUS. Cinchona bark. *Peruvian bark. Jesuits bark.*

The account of this valuable remedy already given under Botany, p. 133. and the article Cinchona, has been so ample, that we shall add nothing to it in this place, but shall immediately proceed to notice the officinal preparations, referring our readers for further information on the simple, to Percival's Essays, the Synopsis Materiæ Medicæ, the Thesaurus Medicaminum, and Dr Duncan's Dispensatory.

Officinal Preparations.

402 Infusion of cinchona bark.

a. Infusum Cinchonæ officinalis, E. Infusion of cinchona bark.

This is made by infusing an ounce of powdered cinchona bark in a pound of water for 24 hours, and filtering.

Dose from two to four ounces.

b. Decoctum Cinchonæ officinalis, E. DECOCTUM CORTICIS PERUVIANI, L. D. Decoction of cinchona bark.

Prepared by boiling an ounce of powdered cinchona bark in about a pound and a half of water for 10 minutes, and straining the liquor while hot.

This is scarcely so good a preparation as the infusion. The ordinary dose is three or four ounces.

403 Tincture of cinchona bark.

c. Tinctura Cinchonæ officinalis, E. TINCTURA CORTICIS PERUVIANI, L. D. Tincture of cinchona bark.

Made by digesting four or six ounces of powdered cinchona bark in about two or two pounds and a half of diluted alcohol for seven or eight days, and straining the liquor through paper.

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This is seldom given by itself, being generally added to the decoction or infusion. Dose three or four drams to an ounce.

d. Tinctura Cinchonæ composita, L. D. Compound tincture of cinchona bark. *Huxham's tincture of bark.*

This is a very aromatic tincture of bark, made by digesting two ounces of powdered cinchona, from half an ounce to an ounce and a half of dried Seville orange peel, three drams bruised Virginian snake root, a dram of saffron, and two scruples of powdered cochineal, in 20 ounces or two pounds of proof spirit for 14 days, and straining.

Dose two or three drams.

404 Ammoniated tincture of cinchona.

e. Tinctura Cinchonæ ammoniata, L. Ammoniated tincture of cinchona.

Made by digesting four ounces of powdered cinchona in two pints of compound spirit of ammonia for 10 days in a close vessel.

As a preparation of cinchona bark, this is useless, and as a stimulus it is not preferable to the compound spirit of ammonia by itself.

405 Extract of cinchona bark.

f. Extractum Cinchonæ officinalis, E. Extract of cinchona bark.

This is made in the same manner as extract of jalap, see N° 387.

g. Extractum Cinchonæ, L. Extract of bark.

The following is the process of the London college for making this extract.

Take of Peruvian bark, in coarse powder, one pound; distilled water, 12 pints. Boil for a hour or two, and pour off the liquor, which, while hot, will be red and pellucid, but, as it grows cold, will become yellow and turbid. The same quantity of water being again poured on, boil the bark as before, and repeat the boiling until the liquor, on becoming cold, remains clear. Then reduce all these liquors, mixed together and strained, to a proper thickness by evaporation. This extract must be prepared under two forms; one *soft*, and fit for making pills, and the other hard and pulverizable.

The Dublin college gives separate processes for making their hard and soft extract of cinchona; but they do not materially differ from the above.

All these extracts may be given in the form of pills, in a dose of from 10 to 20 grains, or by way of clyster in the quantity of a dram or two.

406 Cinchona of the Caribbean islands.

73. Cinchona Caribbæa, E. Cinchona of the Caribbean isles.

This is a species of cinchona introduced here by Dr Wright. In medical properties it resembles the former, and may be substituted for it.

407 Blue cardinal flower.

74. Lobelia syphilitica, E. Blue cardinal flower. See Botany, p. 133.

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75. CEPHAELIS IPECACUANHA, E. IPECACUANHA, L. D. Ipecacuan root.

A pretty full account of ipecacuan has been already given in the article BOTANY, under *Psycotria Emetica*, p. 135.

408 Ipecacuan root.

It appears that this drug, or something very similar to the common ipecacuan, is the produce of several vegetables, which are enumerated by Dr Duncan in his Dispensatory.

Ipecacuan is given as an emetic, in full doses of a scruple or 25 grains; as an expectorant, in doses of one grain, repeated every three or four hours; as a diaphoretic, given in combination with opium; and as an antispasmodic, given from three to six grains.

When properly administered, it proves serviceable in the following diseases, viz. in intermittent fevers, a paroxysm of which has often been arrested by giving it as an emetic about an hour before the paroxysm was expected to come on; in continued fevers, given at the commencement as an emetic, and followed by a diaphoretic regimen; in several inflammatory diseases, as rheumatism, given as a diaphoretic; in pneumonia, exhibited to excite and keep up nausea without vomiting; in dysentery, in which it was formerly deemed a specific; in exanthematous diseases, especially where the eruption is disposed to recede; in hemorrhages, given in nauseating doses; in several spasmodic affections, as epilepsy, asthma, dyspnœa, chincough, chronic diarrhœa, hysteria; in mental alienation, as *melancholia* and *mania*, given in large doses; in some kinds of dropsy; in jaundice; in amaurosis.

Ipecacuan is best exhibited in substance; but it is often given in the form of a vinous infusion.

Officinal Preparations.

409 Ipecacuan wine.

a. VINUM IPECACUANHÆ. Wine of ipecacuan.

This is made by digesting two ounces of bruised ipecacuan root in about two pounds of Spanish white wine, for about a week, and straining.

This preparation being more palatable than the ipecacuan in substance, is well suited to delicate and squeamish patients. It may be given from an ounce to two ounces.

410 Powdered ipecacuan and opium.

b. PULVIS IPECACUANHÆ ET OPII, E. PULVIS IPECACUANHÆ COMPOSITUS, L. D. PULVIS DOVERI. Powder of ipecacuan and opium. *Compound powder of ipecacuan. Dover's powder.*

This powder is prepared by triturating eight parts of crystallized sulphate of potash, with one part of hard dry opium, and one part of powdered ipecacuan, till they are reduced to a very fine powder.

The crystallized salt in this process serves the purpose of reducing the opium and ipecacuan to a state of very minute division, and thus renders them more effectual. This is a valuable diaphoretic, and may be given from 10 to 20 grains; but where a long continued sweat is desired to be kept up, it is better to give 10 or 15 grains at first, and 10 or 5 grains more a few hours after.

411 Buckthorn.

76. RHAMNUS CATHARTICUS, E. SPINA CERVINA, L. Buckthorn. See BOTANY, p. 139.

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Officinal Preparation.

a. SYRUPUS RHAMNI CATHARTICI, E. SYRUPUS SPINÆ CERVINÆ, L. Syrup of buckthorn.

412 Syrup of buckthorn.

The Edinburgh college directs this to be made with two parts of the depurated juice of ripe buckthorn berries, and one part of double refined sugar, boiled to the consistence of a syrup. The London process is more complex. It directs a gallon of the fresh juice of ripe buckthorn berries, an ounce of bruised ginger, an ounce and a half of powdered pimento, and seven pounds of double refined sugar. The juice is to be set aside for three days, and then strained from the fæces. The ginger and pimento are to be macerated for four hours in a pint of the strained liquor. In the mean time the rest of the juice is to be boiled down to three pints; then the sugar and the pint of juice in which the spices had been macerated, are to be added, and the whole boiled to the consistence of a syrup.

This syrup is a good cathartic, but is seldom given alone, except to children. Dose from six drams to an ounce and a half.

77. VITIS VINIFERA, E. The vine.

413 Wine.

The remedies drawn from the vine are wine, grapes, and supertartrate of potash.

The properties of wine as a stimulant and cordial, have been already mentioned. See N° 100. The wines usually employed in medicine are,

Vinum album hispanum, *white Spanish wine.*
Vinum album rhenanum, *Rhenish wine.*
Vinum rubrum lusitanum, *red Port wine.*

The last, besides the stimulating power common to all wines, possesses much astringency, and is therefore better suited to cases of debility.

78. UVÆ PASSÆ. Raisins.

414 Raisins.

These are chiefly employed as emollients and demulcents.

79. SUPERTARTRAS POTASSÆ. SUPERTARTRIS POTASSÆ. TARTARI CRYSTALLI, L. D. CREMOR TARTARI. Supertartrate of potash. *Crystals of tartar. Cream of tartar.*

415 Supertartrate of potash.

For the chemical nature of this salt, see CHEMISTRY.

This salt is employed in medicine chiefly as a gentle laxative and refrigerant. As a laxative, it may be given in the dose of from two drams to half an ounce, mixed with syrup or honey, or dissolved in a large quantity of barley water. In the latter way it has been found a good diuretic in dropsies. As a refrigerant, it is given in a diluted solution, sweetened with sugar, or some pleasant syrup.

Officinal Preparations.

a. TARTRAS POTASSÆ. TARTRIS POTASSÆ, E. KALI TARTARISATUM, L. ALKALI VEGETABILE TARTARISATUM, D. Tartrate of potash. *Tartarised kali. Tartarised vegetable alkali. Soluble tartar.*

416 Tartrate of pota-h.

This salt is prepared by adding to a solution of supertartrate of potash, a sufficient quantity of subcarbo-

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nate of potash, to neutralize the excess of tartaric acid. For this purpose it usually requires about one part of the alkaline carbonate to three parts of supertartrate of potash. After neutralization, the liquor is filtered, and set by to crystallize.

This salt forms an excellent cooling purgative, and may be given in doses of from half an ounce to an ounce. It forms a good addition to rhubarb.

417 Tartrate of potash and soda.

b. TARTRAS POTASSÆ ET SODÆ. TARTRIS POTASSÆ ET SODÆ, E. NATRON TARTARISATUM, L. SAL RUPELLENSIS, D. Tartrate of potash and soda. *Tartarized natron. Rochelle salt.*

Prepared by adding to a solution of supertartrate of potash, a sufficient quantity of carbonate of soda, to neutralize the excess of tartaric acid, filtering the liquor, and crystallizing.

This triple salt is a more agreeable laxative than the former, but is not so strong. Usual dose from one to two ounces.

418 Purest subcarbonate of potash.

c. SUBCARBONAS POTASSÆ PURISSIMUS. CARBONAS POTASSÆ PURISSIMUS, E. SAL TARTARI. Purest subcarbonate of potash. *Salt of tartar.*

Prepared by burning all the tartaric acid from *tartar*, solution in water, filtration and crystallization.—Similar in its uses with N° 313. which see.

419 Sweet violet.

80. VIOLA ODORATA, E. VIOLA, L. D. Sweet violet. See BOTANY, p. 141.

Officinal Preparations.

420 Syrup of violets.

a. SYRUPUS VIOLÆ ODORATÆ, E. SYRUPUS VIOLÆ, L. D. Syrup of violets.

Made by macerating one pound or two pounds (L. D.) of the fresh petals of violets, in four pounds or five pints (L.) or six pounds (D.) of boiling water for 24 hours, straining the liquor without expression, and boiling it with a sufficient quantity of double refined sugar, to make a syrup.

A gentle laxative for young children.

421 Red currants.

81. RIBES RUBRUM. Red currants.

The fruit of red currants is used as a refrigerant in febrile affections.

422 Black currants.

82. RIBES NIGRUM. Black currants.

Also employed as a refrigerant; and the following preparations form a good domestic palliative in inflammatory affections of the throat, and in tickling coughs.

Officinal Preparations.

423 Inspissated juice of black currants.

a. SUCCUS SPISSATUS RIBIS NIGRI. Inspissated juice of black currants.

This is made by expressing and clarifying the juice of ripe black currants, and then evaporating it in a bath of water with muriate of soda, to a proper consistence.

424 Syrup of black currants.

b. SYRUPUS RIBIS NIGRI. Syrup of black currants.

Prepared by boiling the depurated juice of black currants with a sufficient quantity of sugar to make a syrup.

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Order 2. DIGYNIA.

425 Gentian.

83. GENTIANA LUTEA, E. GENTIANA, L. D. Gentian root.

The root of gentian is moderately long, slender, branched, brownish on the outside, of a reddish yellow or gold colour within. It is perennial, a native of the mountainous parts of Germany, &c. whence the shops are generally supplied with the dried roots.

Among the gentian brought to London, some years ago, a root of a different kind was mixed, the use of which occasioned violent disorders, and in some instances, as is said, proved fatal. This root is externally of a paler colour than gentian, and its longitudinal wrinkles finer and closer; on cutting the two roots, the difference is more remarkable, the poisonous root being white without any degree of the yellow tinge which is deep in gentian; nor is its taste bitter, like that of gentian, but mucilaginous.

Gentian root is a strong flavourless bitter; in taste less exceptionable than most of the other common strong bitters, and hence among us most generally made use of. The flavour and aromatic warmth wanting to render it grateful, and acceptable to the stomach, are supplied by additions.

The root of this plant is a valuable substance, very successfully and very generally employed as a stomachic and strengthening medicine. It is particularly useful in various chronic affections connected with debility, such as dyspepsia, diarrhœa, hysteria, chlorosis, dropsy. It has also been given with good effect in intermittent fevers, joined with the Peruvian bark; and in convalescencies from all fevers. In these and other cases it is combined with aromatics and chalybeates; sometimes with acids; at other times with alkaline salts, especially in dyspeptic and chlorotic affections, as also in certain disorders of the bowels; with absorbents and aromatics in cases of gout.

The use of this bitter, like that of many others, must not, however, be carried too far, as by weakening the energy of the nervous system, it predisposes to palsy and apoplexy.

Officinal Preparations.

426 Compound infusion of gentian.

a. INFUSUM GENTIANÆ COMPOSITUM, E. L. D. INFUSUM AMARUM. Compound infusion of gentian. *Bitter infusion.*

The Edinburgh infusion is made by steeping half an ounce of sliced gentian root, one dram dried peel of Seville oranges, half a dram of coriander seeds bruised, first in four ounces of diluted alcohol for three hours, and then adding one pound of water; macerating without heat for twelve hours, and then straining.

This infusion, according to the London Pharmacopœia, is made by macerating for an hour in boiling water, twelve ounces by measure, one dram of sliced gentian root, one dram and a half dried orange peel, half an ounce of fresh outer rind of lemons. The Dublin formula directs two drams of bruised gentian root, half an ounce fresh outer rind of lemons, one dram and

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a half of dry orange peel, four ounces of diluted alcohol, and twelve ounces of boiling water; and the infusion is to be made first by alcohol and afterwards with the addition of water, nearly as in the Edinburgh process.

These infusions form a good tonic remedy in debility of the alimentary canal. A glass of them may be given twice or thrice a-day, either alone, or with the addition of some aromatic tonic tincture.

427 Compound tincture of gentian.

b. TINCTURA GENTIANÆ COMPOSITA, E. L. TINCTURA AMARA. ELIXIR STOMACHICUM. Compound tincture of gentian. *Bitter tincture. Stomachic elixir.*

The Edinburgh tincture is prepared by macerating two ounces of sliced and bruised gentian root, an ounce of dried and bruised Seville orange peel, half an ounce of bruised canella alba, and half a dram of powdered cochineal, in two pounds and a half of diluted alcohol for seven days. The tincture of the London college is made with two ounces of sliced and bruised gentian, one ounce of dried orange peel, half an ounce lesser cardamom seeds, husked and bruised, digested for eight days in two pints of proof spirit.

These tinctures are seldom given alone, but may be administered in a dose of two or three drams in a glass of water.

428 Compound wine of gentian.

c. VINUM GENTIANÆ COMPOSITUM, E. VINUM AMARUM. Compound wine of gentian. *Bitter wine.*

Prepared of half an ounce of gentian root, one ounce of cinchona bark, two drams of Seville dried orange peel, one dram of canella alba, four ounces diluted alcohol, two pounds and a half of Spanish white wine. The diluted alcohol is first poured on the root and bark sliced and bruised, and after 24 hours adding the wine, then macerating for seven days and straining. Dose from two drams to half an ounce.

429 Extract of gentian.

d. EXTRACTUM GENTIANÆ LUTEÆ, E. EXTRACTUM GENTIANÆ, L. D. Extract of gentian.

This is made by evaporating the saturated and strained decoction of the root to a consistence fit for being made into pills, under which form it is frequently prescribed in all those cases in which the infusion and tincture are employed. Dose of this extract from ten grains to half a dram. It is seldom given alone, but generally in combination with aromatic and aloetic powders, with myrrh, sulphurate of iron, &c.

430 Elm bark.

84. ULMUS CAMPESTRIS, E. ULMUS, L. D. Elm bark.

The inner bark of the elm is frequently employed in cutaneous eruptions, as an alterative, or gentle diaphoretic, in the form of decoction.

431 Decoction of elm bark.

Officinal Preparation.

a. DECOCTUM ULMI, L. Decoction of elm bark.

Made by boiling four ounces of the fresh inner bark of elm bruised, in four pints of water to two, and straining. Dose about four ounces, repeated several times a-day.

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This medicine probably does not deserve the reputation it has acquired.

432 Eryngo root.

85. ERYNGIUM MARITIMUM. ERYNGIUM, L. D. Eryngo root. See BOTANY, p. 144.

433 Carrot.

86. DAUCUS CAROTA, E. DAUCUS SYLVESTRIS, L. D. Wild carrot seed.

The seeds are sometimes employed as a carminative, and have been recommended as a diuretic. They are seldom used.

The grated roots of cultivated carrot are frequently applied as a poultice to cancerous and ill-conditioned ulcers.

434 Hemlock.

87. CONIUM MACULATUM, E. CICUTA, L. D. Hemlock. See BOTANY, p. 145.

Hemlock has been employed chiefly in scrophulous and cancerous disorders, both internally and externally, and in many of these cases, with considerable benefit; in other instances, without any sensible relief, even after being continued for a great length of time. Like most proposers of new remedies, *Stoerck* has been too profuse in his encomiums on hemlock. It has been found useful in chronic rheumatism, and some cases of gout, where opium disagreed, and in that acutely painful complaint termed *tic douloureux;* as also in caries of the bones and bad venereal ulcerations. Dr Butter prescribed it with marked success in the hooping-cough; and being less stimulant than opium, and less liable to check expectoration, it generally answers better than the inspissated juice of the poppy, in cases of phthisis pulmonalis. The dried leaves may be given alone in doses of five to 15 grains. With the inspissated juice and powder are joined, according to the nature of the disorder in which they are given, calomel, guaiacum, ammoniacum, &c. In the administration of this, as of all other narcotic medicines, it is proper to begin with the smallest doses, afterwards gradually increasing them to as much as the patients can well bear. In this manner many instances are recorded where astonishing quantities of hemlock have been taken, in cancerous and other painful disorders, without disturbing the constitution. It is a sign that the medicine has been pushed to its utmost length, when it disorders the head, stomach, or bowels. For external use, fomentations, cataplasms, and plasters, are prepared from this vegetable *.

* *Practical Synopsis*, vol. ii.

Officinal Preparation.

435 Inspissated juice of hemlock.

a. SUCCUS SPISSATUS CONII MACULATI, E. SUCCUS SPISSATUS CICUTÆ, D. Inspissated juice of hemlock.

This is made by expressing hemlock which is gathered when the flowers are beginning to appear, and allowing the juice to stand six hours until the feces subside, then reducing the decanted juice to dryness in a water bath.

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This extract may be given in a dose of two grains, increasing it gradually as long as seems prudent.

436 Creeping skirret.

88. Sium nodiflorum. SIUM, L. Creeping skirret.

Formerly employed as an emmenagogue and lithontriptic, but now seldom used.

437 Cummin seeds.

89. Cuminum Cyminum. CUMINUM, L. Cummin seed. See Botany, p. 146.

Officinal Preparations.

438 Cataplasm of cummin.

a. Cataplasma Cumini, L. Cataplasm of cummin seed.

This is made of cummin seed one pound; of bay berries, dried leaves of water germander, virginian snakeroot, each three ounces; cloves one ounce; rubbed together into a powder, and formed into a cataplasm with three times their weight of honey.

439 Cummin plaster.

b. Emplastrum Cumini, L. Cummin plaster.

This is composed of cummin seeds, carraway seeds, bay berries, each three ounces; Burgundy pitch three pounds, and yellow wax three ounces. The pitch and wax are first melted together, and the other ingredients in fine powder mixed with them.

Both these preparations are intended for external application to the belly, in some disorders of the stomach and bowels, which require such a stimulus.

440 Asafœtida.

90. Ferula Asafoetida, E. ASAFOETIDA, L. D. Asafœtida. See Botany, p. 145. and Chemistry, N° 2490.

Officinal Preparations.

441 Purified asafœtida.

a. Asafoetida purificata. Purified asafœtida.

Asafœtida is purified in the same manner as gum ammoniac.

442 Emulsion of asafœtida.

b. Lac Asafoetidæ, L. Emulsion of asafœtida.

This is made in the same manner as the emulsion of gum ammoniac (See N° 336.), and is given in similar doses.

443 Tincture of asafœtida.

c. Tinctura Ferulæ Asafoetidæ, E. TINCTURA ASAFOETIDÆ, L. D. Tincture of asafœtida.

This tincture is prepared by digesting four ounces of asafœtida in two pounds and a half (E.), or two pounds (D.), or two pints (L.), of rectified spirit of wine, for about a week,

This is a good preparation of asafœtida, and may be given in doses of from 20 to 60 drops.

444 Compound pills of asafœtida.

d. Pilulæ Asafoetidæ compositæ, E. Compound asafœtida pills.

Made by beating together asafœtida, galbanum, and myrrh, of each eight parts, and one part of rectified oil of amber, into a mass with simple syrup. Dose 15 grains, or a scruple, three or four times a-day. Chiefly in hysteria.

e. Emplastrum Asafoetidæ, E. Plaster of asafœtida.

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Made by melting together plaster of semivitrified oxide of lead, asafœtida, of each two parts, and galbanum and yellow wax, of each one part.

445 Plaster of asafœtida.

Applied to the belly in hysteria.

446 Galbanum.

91. Bubon Galbanum, E. GALBANUM, L. D. Galbanum. See Chemistry, N° 2494.

Galbanum is employed in similar cases as asafœtida. It is seldom given alone.

Officinal Preparations.

447 Purified galbanum.

a. Galbanum purificatum. Strained galbanum.

Galbanum is purified by melting it, inclosed in a bladder, by the heat of boiling water, and straining it through linen.

448 Tincture of galbanum.

b. Tinctura Galbani, L. Tincture of galbanum.

This is made by digesting two ounces of galbanum, cut into small pieces, in two pints of proof spirit, for eight days, with a gentle heat and straining. Dose from one to two drams.

449 Compound galbanum. pills.

c. Pilulæ Galbani compositæ, L. Compound galbanum pills.

Prepared of opoponax, myrrh, sagapenum, of each an ounce, asafœtida half an ounce.

Similar to the asafœtida pills, and given in similar doses.

450 Angelica.

92. Angelica Archangelica, E. ANGELICA, L. D. Angelica.

An elegant aromatic, but seldom employed.

451 Coriander seeds.

93. Coriandrum sativum, E. CORIANDRUM. Coriander seeds. See Botany, p. 147.

452 Carraway seeds.

94. Carum carui, E. CARUON, L. CARUI, D. Carraway seeds. See Botany, p. 147.

Officinal Preparations.

453 Oil of carraway.

a. Oleum volatile Cari carui, E. OL. CARUI, L. D. Volatile oil of carraway.

Prepared by distillation in the same manner as the oil of rosemary. A very warm stimulant. Dose two or three drops.

454 Spirit of carraway.

b. Spiritus Cari carui, E. SPIRITUS CARUI, L. D. Spirit of carraway.

Prepared by macerating half a pound of bruised carraway seeds in eight or nine pounds of proof spirit for a day or two, and then with the addition of a sufficient quantity of water to prevent burning, distilling off the spirit.

A good dram, where drams are required, as in flatulent colic. Dose half an ounce to an ounce.

455 Opoponax.

95. Pastinaca opoponax. OPOPONAX, L. Opoponax.

One of the gum-resins, brought from the East Indies and the Levant. It possesses properties similar to those

of

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of galbanum and asafœtida, and is usually employed in combination with them.

96. ANETHUM GRAVEOLENS, L. Dill-seed.

456 Dill seed. This seed is of a nearly oval shape, convex on one side and flat on the other, of a yellowish colour, of a warm pungent taste and aromatic smell. Employed sometimes as a carminative.

Officinal Preparation.

457 Water of dill. *a.* AQUA DISTILLATA ANETHI, L. Dill water.

A gallon of water distilled from a pound of bruised dill seeds.

458 Sweet fennel seed. 97. ANETHUM FOENICULUM, E. FOENICULUM, L. D. Sweet fennel seeds. See BOTANY, p. 147.

Officinal Preparations.

459 Water of sweet fennel. *a.* AQUA DISTILLATA FOENICULI DULCIS, L. D. Sweet fennel water.

Prepared as *dill water.*

460 Oil of fennel. *b.* OLEUM VOLATILE FOENICULI DULCIS, D. Oil of sweet fennel seeds. Prepared as the *oil of rosemary*, &c.

461 Parsley. 98. APIUM PETROSELINUM, E. PETROSELINUM, L. Parsley.

The seeds of parsley are carminative, and the root is gently diuretic.

462 Aniseed. 99. PIMPINELLA ANISUM, E. ANISUM, L. D. Aniseeds.

This plant is cultivated in Asia, and in the south of Europe. The seeds have a peculiar grateful smell, and a sweet aromatic taste.

They are gently stimulant, carminative and expectorant.

Officinal Preparations.

463 Oil of aniseed. *a.* OLEUM VOLATILE PIMPINELLÆ ANISI, E. OLEUM VOLATILE ANISI, L. D. Volatile oil of aniseed.

Prepared as the other volatile oils.

This oil freezes at no very low temperature. It is a powerful and grateful stimulant. Dose, a drop or two.

464 Compound spirit of aniseed. *b.* SPIRITUS ANISI COMPOSITUS, L. Compound spirit of aniseed.

From aniseed and angelica seed, of each half a pound, proof spirit a gallon, and enough water to prevent burning, a gallon of spirit is distilled.

A very agreeable cordial in cases of flatulence.

Order 3. TRIGYNIA.

465 Elder. 100. SAMBUCUS NIGRA, E. SAMBUCUS, L. D. Elder leaves, bark, and berries. See BOTANY, p. 148.

Officinal Preparations.

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a. SUCCUS SPISSATUS BACCÆ SAMBUCI, L. D. Inspissated juice of elder leaves.

466 Inspissated juice of elder.

Prepared in the same way as the juice of black currants. See N° 422.

467 Elder ointment. *b.* UNGUENTUM SAMBUCI, L. UNG. SAMBUCINUM, D. Elder ointment.

Prepared by boiling four pounds of elder flowers in three pounds of mutton suet and a pint of olive-oil till they are crisp, and then straining.

468 Poison oak. 101. RHUS TOXICODENDRON, E. Poison oak.

The leaves of this shrub, which is a native of North America, are very acrid, and have lately been introduced into practice by Dr Alderson of Hull as a remedy for palsy. Dose half a grain or a grain. In Edinburgh it has been less successful than with Dr Alderson. See Alderson's "Essay on the Rhus Toxicodendron," and Duncan's Dispensatory.

469 Lintseed. 102. LINUM USITATISSIMUM, E. LINUM, L. D. Common flax. Lintseed. See BOTANY, p. 149.

Officinal Preparations.

470 Lintseed oil. *a.* OLEUM LINI USITATISSIMI, E. Lintseed oil.

Expressed from the seeds by inclosing them in a hempen bag after beating them in a stone mortar. It should be expressed without heat.

Emollient. Has been given with success in some cases of *hæmoptysis*, *nephritis*, *colic*, and some internal inflammations. Dose an ounce or two, made into an emulsion.

471 Purging flax. 103. LINUM CATHARTICUM, D. Purging flax. See BOTANY, p. 149.

CLASS VI. HEXANDRIA. Order 1. MONOGYNIA.

472 Barberry. 104. BERBERIS VULGARIS. BERBERIS, D. Barberry.

The fruit is employed as a refrigerant. See BOTANY, p. 159.

473 Garlic. 105. ALLIUM SATIVUM, E. L. D. Garlic. See BOTANY, p. 156, where a long account is given of its nature and uses.

Officinal Preparations.

474 Syrup of garlic. *a.* SYRUPUS ALLII, D. Syrup of garlic.

Prepared by macerating a pound of sliced garlic in two pounds of boiling water in a close vessel for 12 hours, and then adding to the strained liquor four pounds of double refined sugar.

475 Onion. 106. ALLIUM CEPA. CEPA, D. Onion.

A gentle diuretic when raw, but chiefly used roasted by way of a cataplasm.

476 Aloes. 107. ALOE PERFOLIATA, E. ALOE SOCOTORINA, L. D. Aloes.

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So full an account of the several varieties of aloes and their uses in medicine has been given under BOTANY, p. 158, that it is necessary for us here only to notice its

Officinal Preparations.

477 Powder of aloes with canella.

a. PULVIS ALOES CUM CANELLA, L. HIERA PICRA. Powder of aloes with canella.

Prepared of a pound of socotorine aloes, and three pounds of white canella, powdered separately and then mixed together.

A warm stimulant cathartic. Dose 10 grains to 20. Best given in the form of pill.

478 Aloetic powder with guaiacum.

b. PULVIS ALOETICUS CUM GUAIACO, L. Aloetic powder with guaiacum.

Prepared by mixing together an ounce and a half of powdered socotorine aloes, an ounce of powdered resin of guaiacum, and half an ounce of aromatic powder. Dose as of the preceding.

479 Aloetic powder with iron.

c. PULVIS ALOETICUS CUM FERRO, L. Aloetic powder with iron.

Prepared of socotorine aloes, an ounce and a half, myrrh two ounces, dry extract of gentian and vitriolated iron, each an ounce, powdered separately, and mixed together.

This is considered as a good emmenagogue in a dose of 15 grains.

480 Aloetic pills.

d. PILULÆ ALOETICÆ, E. D. PILULÆ ALOES COMPOSITÆ, L. Aloetic Pills. *Compound pills of aloes.*

The Edinburgh aloetic pills are prepared by beating together into a mass equal parts of powdered aloes and soap. Those of the London college are made of an ounce of powdered socotorine aloes, half an ounce of extract of gentian, two scruples of oil of carraway seeds, and enough syrup of ginger to form a mass. The Dublin pills are made of an ounce of Barbadoes aloes, with half an ounce of extract of gentian, and two drams of powdered ginger, formed into a mass with soap jelly.

Any of these compositions forms a good cathartic for sedentary people. Dose 10 to 20 grains.

481 Pills of aloes and asafœtida.

e. PILULÆ ALOES ET ASAFOETIDÆ, E. Pills of aloes and asafœtida.

Prepared with equal parts of powdered aloes, asafœtida and soap, made into a mass with mucilage of gum arabic.

A good remedy in dyspepsia, especially in females. Dose about 10 grains, twice a-day.

482 Pills of aloes and colocynth.

f. PILULÆ ALOES CUM COLOCYNTHIDE, E. Pills of aloes with colocynth.

These are formed of socotorine aloes, scammony, each eight parts, colocynth four parts, oil of cloves and sulphate of potash with sulphur, each one part. The aloes, scammony, and salt, are together reduced to powder, and mixed with the colocynth previously beat to a fine powder; then the oil is added, and the mass formed with mucilage of gum arabic.

A powerful purgative, well suited to melancholia and similar diseases. Dose 10 to 20 grains.

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g. PILULÆ ALOES ET MYRRHÆ, E. L. PILULÆ RUFI. Pills of aloes and myrrh. *Rufus's pills.*

483 Pills of aloes and myrrh.

Prepared of four parts of socotorine aloes, two parts of myrrh, and two parts of saffron (one part L.), made into a mass with syrup of saffron.

A good laxative and stomachic. Dose 15 or 20 grains.

484 Extract of aloes.

h. EXTRACTUM ALOES, C. Extract of Aloes.

Prepared as *extract of gentian.*

485 Tincture of aloes.

i. TINCTURA ALOES SOCOTORINÆ, E. TINCTURA ALOES, L. D. Tincture of aloes.

Made by digesting half an ounce of powdered socotorine aloes and an ounce and a half of extract of liquorice, in four ounces of alcohol and a pound of distilled water (E.), or in eight ounces of proof spirit with the same quantity of distilled water (L.), for a few days, with a gentle heat and frequent agitation. Dose about an ounce.

486 Tincture of aloes and myrrh.

k. TINCTURA ALOES ET MYRRHÆ, E. TINCTURA ALOES COMPOSITA, L. Tincture of aloes and myrrh. *Compound tincture of aloes.*

This tincture, according to the Edinburgh process, is prepared by first digesting two ounces of powdered myrrh in a pound and a half of alcohol mixed with half a pound of water, for four days; then adding an ounce and a half of powdered socotorine aloes, and an ounce of saffron; digesting for three days longer, and pouring off the tincture. The London tincture is made by digesting three ounces of socotorine aloes and the same quantity of saffron, in two pints of tincture of myrrh, for eight days, and straining it.

These tinctures differ in strength; the Edinburgh tincture may be given in a dose of half an ounce or six drams; the London one in half that quantity.

487 Etherial tincture of aloes.

l. TINCTURA ALOES ÆTHEREA, E. Etherial tincture of aloes.

This tincture is prepared by digesting socotorine aloes, and myrrh powdered, of each an ounce and a half, with an ounce of sliced saffron, in a pound of sulphuric ether with alcohol; first digesting the myrrh alone for four days, then adding the rest, digesting for four days longer, and straining.

More stimulating than the other tinctures. Dose two or three drams.

488 Wine of aloes.

m. VINUM ALOES SOCOTORINÆ, E. VINUM ALOETICUM, D. VINUM ALOES, L. Wine of socotorine aloes. *Aloetic wine. Sacred elixir.*

The Edinburgh wine is prepared by digesting an ounce of powdered socotorine aloes, and lesser cardamom seed, and ginger bruised, of each a dram, in two pounds of Spanish white wine, for seven days, with occasional agitation and straining. The Dublin college directs four ounces of powdered socotorine aloes, and two ounces of powdered canella alba, in four pounds of Spanish white wine for fourteen days, with frequent agitation and then filtrating. In the London process, the proportions are, eight ounces of powdered aloes, two

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two ounces of powdered canella, six pints of Spanish white wine, and two pints of proof spirit.

This appears from long experience to be a medicine of excellent service. The dose as a purgative is from one to two ounces. It may be introduced into the habit, so as to be productive of excellent effects, as an alterant, by giving it in small doses, at proper intervals: thus managed, it does not for a considerable time operate remarkably by stool; but at length proves purgative, and occasions a lax habit of much longer continuance than that produced by other common cathartics.

489 Squill.

108. SCILLA MARITIMA, E. SCILLA, L. D. Squill. See BOTANY *Index*.

When the root of squill is taken in large doses, it produces a violent vomiting and purging, and sometimes strangury, bloody urine, and inflammation and erosion of the stomach or bowels; in moderate doses it proves emetic, without any farther consequence, and in small doses, it is a good expectorant and diuretic. It is chiefly employed as an expectorant in asthma and peripneumony, and as a diuretic in dropsy.

Officinal Preparations.

490 Dried squill.

a. SCILLA MARITIMA EXSICCATA, E. SCILLA EXSICCATA, L. SCILLÆ PREPARATÆ, D. Dried squill.

Squill is dried by first removing its outer coat, then cutting it transversely into thin slices, and drying these with a gentle heat.

The sign of its being properly dried is that it be rendered friable without losing its bitterness and acrimony. This is an excellent mode of preparing squill, where it is to be given in substance. The dose of dried squill, when reduced to powder and given as an expectorant or diuretic, is from one grain to three.

491 Vinegar of squill.

b. ACETUM SCILLÆ MARITIMÆ, E. ACETUM SCILLÆ, L. ACETUM SCILLITICUM, D. Vinegar of squill.

This is made by macerating dried squill in vinegar or distilled vinegar, with a proportion of proof spirit. The proportions of the different colleges vary. The Edinburgh college directs two ounces of squill to two pounds and a half of distilled acetous acid, and three ounces of alcohol; that of London a pound of squill, six pints of vinegar, and half a pint of proof spirit; while the Dublin proportions are half a pound of squill, three pounds of vinegar, and four ounces of proof spirit. The squill is first macerated with the vinegar for some days with a gentle heat, then the liquor is expressed, and the spirit added to it. Dose from two drams to half an ounce, chiefly in composition.

492 Syrup of squill.

c. SYRUPUS SCILLÆ MARITIMÆ, E. Syrup of squill.

This syrup is made with two pounds of vinegar of squill, and three pounds and a half of double refined sugar, dissolved in a gentle heat.

A good expectorant. Dose from half an ounce to an ounce.

d. OXYMEL SCILLÆ, L. Oxymel of squill.

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Prepared by boiling three pounds of clarified honey, with two pints of vinegar of squill in a glass vessel, with a gentle heat, to the consistence of a syrup.

This is not so good a preparation as the syrup of squill, and is very apt to produce sickness. Dose three or four drams.

493 Oxymel of squill.

e. CONSERVA SCILLÆ, L. Conserve of squill.

494 Conserve of squill.

This is made by beating together in a mortar, an ounce of fresh squill and five ounces of double refined sugar.

A very injudicious and nauseous preparation.

f. TINCTURA SCILLÆ, L. D. Tincture of squill.

495 Tincture of squill.

This tincture is prepared by digesting four ounces of fresh dried squill, in two pints, or two pounds, of proof spirit, for seven or eight days, and pouring off the clear liquor.

This is a good preparation of squill, especially when it is intended as a diuretic. Dose twenty or thirty drops.

g. MEL SCILLÆ, L. MEL SCILLITICUM, D. Honey of squill.

496 Honey of squill.

Prepared by boiling together in a glass vessel, three pounds of clarified honey and two pints of the tincture of squill, to the consistence of a syrup. Dose, a dram or two.

h. PILULÆ SCILLÆ, L. PILULÆ SCILLITICÆ, E. D. Squill pills.

497 Squill pills.

These, according to the London and Dublin colleges, are to be prepared by beating together a dram of fresh dried squill reduced to powder, three drams of powdered ginger, three drams of soap, and two drams of gum ammoniac, with a sufficient quantity of syrup of ginger, or jelly of soap, to form a mass fit for making pills. In the Edinburgh process a scruple of dried squill, in fine powder, a dram of gum ammoniac, a dram of powdered lesser cardamom seeds, and a dram of extracted liquorice, are beaten into a mass, with simple syrup.

This is a good form of squill, when intended as an expectorant. Dose from 10 to 15 grains.

498 White lily.

109. LILIUM CANDIDUM. LILIUM ALBUM, D. White lily root. See BOTANY, p. 156.

499 Calamus aromaticus.

110. ACORUS CALAMUS, E. CALAMUS AROMATICUS, L. Sweet flag. See BOTANY, p. 159.

Order III. TRYGINIA.

500 Colchicum.

111. COLCHICUM AUTUMNALE, E. COLCHICUM, L. D. Colchicum, or *meadow saffron*. See BOTANY, p. 161.

Officinal Preparations.

501 Syrup of colchicum.

a. SYRUPUS COLCHICI AUTUMNALIS, E. Syrup of colchicum.

Prepared by first macerating an ounce of fresh colchicum root, cut into thin slices, in 16 ounces of vinegar,

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gar for two days, with occasional agitation, and the boiling the expressed liquor with 26 ounces of double refined sugar into a syrup.

Employed as a diuretic, in a dose of from a dram to an ounce or more.

502 Oxymel of colchicum.

b. OXYMEL COLCHICI, L. Oxymel of colchicum.

This is made in the same manner as the syrup, only that two pounds of clarified honey are used instead of sugar to the pint of vinegar of colchicum. It is given in similar doses with the former.

503 Sorrel.

112. RUMEX ACETOSA, E. ACETOSA PRATENSIS, L. ACETOSA, D. Sorrel. See BOTANY, p. 160.

CLASS VII. HEPTANDRIA. Order 1. MONOGYNIA.

504 Horse-chesnut.

113. ÆSCULUS HIPPOCASTANUM, E. HIPPOCASTANUM. Horse-chesnut bark and fruit.

The bark of horse-chesnut is a powerful astringent, and has lately been recommended as a substitute for cinchona. It is certainly a good tonic, and may be given in powder from half a dram to a dram; or a dram of the extract of it may be mixed with an ounce of cinnamon water, and given in the dose of a tea spoonful three or four times a-day. A strong infusion of it, snuffed up the nose, has long been employed as an errhine.

CLASS VIII. OCTANDRIA. Order 1. MONOGYNIA.

505 Elemi.

114. AMYRIS ELEMIFERA. ELEMI, L. Resin of elemi. See BOTANY, p. 166.; and CHEMISTRY, N° 2471.

Officinal Preparations.

506 Elemi ointment.

a. UNGUENTUM ELEMI, D. UNG. ELEMI COMPOSITUM, L. Elemi ointment.

Prepared by first melting a pound of elemi with two pounds of mutton suet, and on removing them from the fire, immediately adding 10 ounces of turpentine and two ounces of olive oil, and straining the mixture.

A stimulating ointment, in much reputation with some surgeons for cleansing ulcers.

507 Balm of Gilead.

115. AMYRIS GILEADENSIS, E. BALSAMUM GILEADENSE. Balsam or balm of Gilead. See BOTANY, p. 166.

508 Mezereon.

116. DAPHNE MEZEREUM, E. MEZEREUM, L. MEZEREON, D. Mezereon or *spurge laurel.* See BOTANY, p. 168.

Officinal Preparations.

509 Decoction of mezereon.

a. DECOCTUM DAPHNES MEZEREI, E. Decoction of mezereon.

Prepared by boiling with a gentle heat two drams of the bark of mezereon root, and half an ounce of bruised liquorice root, in three pounds of water to two pounds.

Much recommended as a diaphoretic and stimulant, in rheumatic affections and in cutaneous eruptions. Dose from four to eight ounces twice a-day.

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510 Great bistort.

117. POLYGONUM BISTORTA, E. BISTORTA, L. D. Great bistort or *snakeweed.* See BOTANY, p. 168.

CLASS IX. ENNEANDRIA. Order 1. MONOGYNIA.

511 Cinnamon.

118. LAURUS CINNAMOMUM, E. CINNAMOMUM, L. D. Cinnamon. *The bark and its essential oil.* See BOTANY, p. 170. and 174. See also the article CEYLON.

Officinal Preparations.

512 Cinnamon water.

a. AQUA LAURI CINNAMOMI, E. AQUA CINNAMOMI, L. D. Cinnamon water. *Barley cinnamon.*

A gallon of water distilled from a pound of bruised cinnamon.

An excellent cordial in a dose of two ounces,

513 Spirit of cinnamon.

b. SPIRITUS LAURI CINNAMOMI, E. SPIRITUS CINNAMOMI, L. D. Spirit of cinnamon.

A gallon of proof spirit distilled from a pound of bruised cinnamon.

Preferable to the former only where ardent spirits are required.

514 Tincture of cinnamon.

c. TINCTURA LAURI CINNAMOMI, E. TINCTURA CINNAMOMI, L. D. Tincture of cinnamon.

Made by digesting three ounces, or three ounces and a half of bruised cinnamon, in about two pounds of proof spirit, for about a week.

A better tonic than the spirit, as it contains the astringent as well as aromatic principle of cinnamon. Dose two or three drams.

515 Compound tincture of cinnamon.

d. TINCTURA CINNAMOMI COMPOSITA, E. L. TINCTURA AROMATICA, D. Compound tincture of cinnamon. *Aromatic tincture.*

Made by digesting an ounce (or six drams, L. D.) of bruised cinnamon, an ounce (or two drams, D. or three drams, L.) of bruised cardamom seeds, two drams of powdered long pepper, (and two drams of powdered ginger, L. D.) in two pounds and a half (or two pounds, D. or two pints, L.) of proof spirit, for seven days.

A very hot tincture, useful in asthenic atony of the stomach. Dose two or three drams.

516 Aromatic powder.

e. PULVIS AROMATICUS, E. L. D. Aromatic powder.

The Edinburgh aromatic powder is prepared of equal parts of cinnamon, lesser cardamom seeds, and ginger, beaten together to a very fine powder. The proportions of the other colleges are cinnamon two ounces, lesser cardamom seeds, ginger and long pepper, of each an ounce. Dose 10 grains to a scruple.

517 Aromatic electuary.

f. ELECTUARIUM AROMATICUM, E. D. CONFECTIO AROMATICA, L. Aromatic electuary or *confection. Cordial confection.*

The

History of Simple and Officinal Medicines.

The Edinburgh electuary is made by mixing one part of aromatic powder with two parts of syrup of orange peel. That of the Dublin college is prepared by mixing three ounces of conserve of orange peel with half an ounce of powdered cinnamon, half an ounce of powdered nutmeg, two drams of powdered ginger, and two drams of saffron, with an ounce of double refined sugar, and beating them together with a sufficient quantity of syrup of orange peel into an electuary. The London confection is made by first macerating half a pound of zedoary in coarse powder, and half a pound of saffron, in three pints of water for 24 hours, pressing out the liquor, and evaporating it to a pint and a half, and adding 16 ounces of compound powder of crabs claws, of cinnamon and nutmeg each two ounces, cloves an ounce, lesser cardamom seeds half an ounce, all in fine powder, and two pounds of double refined sugar, so as to form an electuary.

Of these compositions, the first is the best. Dose a scruple to half a dram.

518 Cassia bark.

119. LAURUS CASSIA, E. CASSIA LIGNEA, D. Cassia bark. See BOTANY, p. 173.

This is commonly employed instead of cinnamon, and though not so delicate, is as efficacious as that expensive drug. The buds of cassia are, we believe, stronger than the bark.

Officinal Preparation.

519 Cassia water.

a. AQUA LAURI CASSIÆ, E. Cassia water.

Distilled like cinnamon water, for which it is commonly substituted.

520 Camphor.

120. LAURUS CAMPHORA, E. The camphor tree. CAMPHORA, L. D. Camphor or *Camphire*. See BOTANY, page 170. and 174; and CHEMISTRY, N° 2441. See also the article CAMPHORA.

Internally camphor is administered as a diaphoretic in typhoid fevers, in rheumatism, in low eruptive fevers, in a dose of from five to 20 grains; and as an antispasmodic in hiccup, hysteria, epilepsy and in mania and melancholia, especially in that maniacal affection that sometimes takes takes place in lying-in women. It is applied externally in cases of gangrene, to discuss indolent tumours, and to disperse collections of milk in the breasts of women who are weaning their infants.

Officinal Preparations.

521 Camphorated emulsion.

a. EMULSIO CAMPHORATA, E. Camphorated emulsion.

Prepared by first beating together two drams of blanched sweet almonds, and a dram of double refined sugar, then rubbing with these a scruple of camphor, and gradually adding six ounces of water to make an emulsion. Dose two or three ounces.

522 Camphorated mixture.

b. MISTURA CAMPHORATA, L. Camphorated mixture.

Made by rubbing a dram of camphor, first with a little rectified spirit of wine, and then with half an ounce of double refined sugar, and adding gradually a pint of boiling distilled water, and straining off the clear liquor.

Scarcely so active as the foregoing. Dose much the same.

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c. TINCTURA CAMPHORÆ, E. SPIRITUS CAMPHORATUS, L. D. Tincture of camphor. *Camphorated spirit.*

523 Tincture of camphor.

A solution of camphor in rectified spirit. The several colleges direct very different proportions, viz. the Edinburgh an ounce, or two or three ounces, of camphor, to a pound of alcohol; the London four ounces to two pints; and the Dublin college half an ounce to eight ounces.

d. OLEUM CAMPHORATUM, E. Camphorated oil.

524 Camphorated oil.

A solution of camphor in oil olive, in the proportion of half an ounce of the former to two ounces of the latter, made by triturating them together in a glass or marble mortar.

e. LINIMENTUM CAMPHORÆ COMPOSITUM, L. LINIMENTUM CAMPHORÆ, D. Compound liniment of camphor.

525 Camphorated liniment.

Made by first mixing six ounces of water of pure ammonia (L.), or 10 ounces of water of carbonated ammonia (D.), with 16 ounces (or two pounds, D.) of spirit of lavender, and distilling off the spirit from a glass retort; then dissolving in the distilled spirit two ounces (L.) or three ounces (D.) of camphor.

These three last are intended for external application in the cases above mentioned, and the last is the most stimulating.

526 Bay.

121. LAURUS NOBILIS, E. LAURUS, L. Bay. See BOTANY, p. 171, and 172.

The leaves, berries, and expressed oil of the berries, are employed in medicine.

527 Sassafras.

122. LAURUS SASSAFRAS, E. SASSAFRAS, L. D. Sassafras wood, root, and bark. See BOTANY, p. 173.

Employed chiefly as a gentle diaphoretic or alterative in cutaneous eruptions, by way of decoction or infusion.

Officinal Preparations.

528 Oil of sassafras.

a. OLEUM VOLATILE LAURI SASSAFRAS, E. OLEUM SASSAFRAS, L. Oil of sassafras.

Distilled as the other volatile oils.

Order 2. TRIGYNIA.

529 Rhubarb.

123. RHEUM PALMATUM, E. RHABARBARUM, L. D. Rhubarb. See BOTANY, p. 175.

Officinal Preparations.

530 Infusion of rhubarb.

a. INFUSUM RHEI PALMATI, E. Infusion of rhubarb.

Made by macerating half an ounce of bruised rhubarb in eight ounces of boiling water for 12 hours; then adding an ounce of spirit of cinnamon, and straining. Dose half an ounce to an ounce and a half.

531 Rhubarb wine.

b. VINUM RHEI PALMATI, E. VINUM RHABARBARI, L. Rhubarb wine.

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The Edinburgh wine is prepared by infusing two ounces of sliced rhubarb and a dram of bruised canella alba in 15 ounces of Spanish white wine, and two ounces of diluted alcohol, for seven days, and straining through paper. The London formula directs two ounces and a half of sliced rhubarb, half an ounce of bruised lesser cardamom seeds, and two drams of saffron, to be digested in two pints of Spanish white wine, and half a pint of proof spirit, for 10 days.

The Edinburgh wine is the stronger, and may be given in the dose of an ounce. Dose of the London, about an ounce and a half, or a small wine glass full.

532 Tincture of rhubarb.

c. TINCTURA RHEI PALMATI, E. TINCTURA RHABARBARI, L. D. Tincture of rhubarb.

Prepared by digesting three ounces (E.) or two ounces (L. D.) of sliced rhubarb, half an ounce (E.) or two drams (L. D.) of bruised cardamom seeds, (and two drams of saffron (L. D.) in two pounds and a half (E.) or two pounds (D.) or two pints (L.) of proof spirit, for about a week, and straining.

As a purgative, this may be given in the dose of an ounce; as a stomachic from two to four drams.

533 Compound tincture of rhubarb.

d. TINCTURA RHABARBARI COMPOSITA, L. Compound tincture of rhubarb.

Prepared of two ounces of sliced rhubarb, half an ounce of bruised liquorice root, two drams of powdered ginger, and two drams of saffron, digested for 14 days in 12 ounces of proof spirit mixed with a pint of distilled water.

Uses and doses as of the preceding

534 Tincture of rhubarb and aloes.

e. TINCTURA RHEI ET ALOES, E. Tincture of rhubarb and aloes.

Made by digesting 10 drams of sliced rhubarb, six drams of powdered socotorine aloes, and half an ounce of bruised cardamom seeds, in two pounds and a half of diluted alcohol, for seven days.

Dose half an ounce to an ounce.

535 Tincture of rhubarb and gentian.

f. TINCTURA RHEI ET GENTIANÆ, E. Tincture of rhubarb and gentian.

Made by digesting two ounces of sliced rhubarb, and half an ounce of sliced gentian root, in two pounds and a half of diluted alcohol, for seven days, and straining.

A good stomachic. Dose two or three drams.

CLASS X. DECANDRIA. Order 1. MONOGYNIA.

536 Balsam of Peru.

124. MYROXYLON PERUIFERUM, E. BALSAMUM PERUVIANUM, L. D. Balsam of Peru. See BOTANY, p. 182, and CHEMISTRY, N° 2484.

Officinal Preparation.

History of Simple and Officinal Medicines.

a. TINCTURA BALSAMI PERUVIANI, L. Tincture of balsam of Peru.

Made by digesting four ounces of balsam of Peru in a pint of rectified spirit of wine till the balsam is dissolved. 537 Tincture of balsam of Peru.

Dose half a dram to a dram and a half as a stimulant.

125. TOLUIFERA BALSAMUM, E. BALSAMUM TOLUTANUM, L. D. Balsam of Tolu. See BOTANY, p. 182, and CHEMISTRY, N° 2483. 538 Balsam of Tolu.

Officinal Preparations.

a. TINCTURA TOLUIFERÆ BALSAMI, E. TINCTURA BALSAMI TOLUTANI, L. D. Tincture of balsam of Tolu. 539 Tincture of balsam of Tolu.

Made by digesting an ounce, or an ounce and a half (D.), of balsam of Tolu, in a pound, or a pint (L.), of alcohol, till the balsam is dissolved.

This is the best form of employing this balsam, and it may be given mixed with honey, or, as in the following preparation, with syrup. Dose, half a dram to two drams as an expectorant or stimulant.

b. SYRUPUS TOLUIFERÆ BALSAMI, L. SYRUPUS TOLUTANUS, L. Syrup of balsam of Tolu, or *balsamic syrup.* 540 Syrup of Tolu.

The Edinburgh college direct this syrup to be prepared by mixing an ounce of the above tincture with two pounds of common syrup. The London process is to boil eight ounces of balsam of Tolu with three pints of distilled water for two hours, strain the liquor, and boil it with a sufficient quantity of double refined sugar to make a syrup. The Edinburgh formula produces both a cheaper and a stronger syrup.

126. CASSIA FISTULA. E. CASSIA FISTULARIS, L. D. Cassia fruit. See BOTANY, p. 181. 541 Cassia fistula.

Officinal Preparations.

a. ELECTUARIUM CASSIÆ FISTULÆ, E. ELECTUARIUM CASSIÆ, L. D. Electuary of cassia. 542 Electuary of cassia.

This is prepared of four parts (E.), or half a pound (L.), of the pulp of cassia; one part (E.), or an ounce (L.), of the pulp of tamarinds; one part (E.), or two ounces (L.), of manna; and four parts or half a pound of syrup of damask roses. The manna is first dissolved in the syrup by a gentle heat, the pulps are then added, and the whole evaporated to the consistence of an electuary.

A gentle laxative. Dose two or three drams.

127. CASSIA SENNA, E. SENNA, L. D. Senna leaves. See Woodville, Lewis, and Duncan (c.) 543 Senna.

Officinal

(c) This volume is now drawing very near a close, and it is indispensable that the present article should not extend beyond it. It is therefore necessary that in the remaining part of the materia medica, we should be extremely concise, and should omit all the natural history, and much of the medical history, of the simple articles. Fortunately, in many cases, these circumstances have been anticipated under BOTANY; and where this has not been the

History of Simple and Officinal Medicines.

Officinal Preparations.

544 Simple infusion of senna.

a. INFUSUM SENNÆ SIMPLEX, L. Simple infusion of senna.

Prepared by macerating an ounce and a half of senna, and a dram of powdered ginger, in a pint of boiling water, for an hour, in a covered vessel. Dose about two or three ounces.

545 Tartarized infusion of senna.

b. INFUSUM SENNÆ TARTARISATUM, L. Tartarized infusion of senna.

Instead of ginger, half an ounce of bruised coriander seeds and two drams of crystals of tartar are here added. Dose as of the above.

546 Infusion of tamarinds with senna.

c. INFUSUM TAMARINDI CUM SENNÆ, E. Infusion of tamarinds with senna.

Prepared by macerating an ounce of preserved tamarinds, a dram (or two, three, &c. drams) of senna, half a dram of bruised coriander seeds, and half an ounce of brown sugar, in eight ounces of boiling water, for four hours, in a glass vessel.

An excellent laxative. Dose from two or four ounces, according to the quantity of *senna*.

547 Compound tincture of senna.

d. TINCTURA SENNÆ COMPOSITA, E. TINCTURA SENNÆ, L. D. Compound tincture of senna.

The Edinburgh tincture is made by digesting two ounces of senna, an ounce of bruised jalap root, and half an ounce of bruised coriander seeds, in three pounds and a half of diluted alcohol, for seven days, straining the tincture, and adding four ounces of double-refined sugar. The London and Dublin tinctures are made by digesting a pound of senna, an ounce and a half of bruised caraway seeds, half an ounce of bruised cardamom seeds, and 16 ounces of stoned raisins, in a gallon or nine pounds (D.) of proof spirit, for 14 days. Dose half an ounce to an ounce and a half.

548 Electuary of senna.

e. ELECTUARIUM CASSIÆ SENNÆ, E. ELECTUARIUM SENNÆ, L. D. Electuary of senna. *Lenitive electuary.*

The Edinburgh and London electuaries are composed of eight ounces of pounded senna, four ounces of powdered coriander seeds, three ounces of liquorice root, half a pound or a pound of figs, half a pound of pulp of tamarinds, half a pound of pulp of prunes (and half a pound of pulp of cassia (L.), and two pounds and a half of double refined sugar. That of Dublin is made of four ounces of powdered senna, a pound of pulp of French prunes, two ounces of pulp of tamarinds, a pound and a half of molasses, and two drams of essential oil of carraway. Dose about half an ounce.

549 Extract of senna.

f. EXTRACTUM CASSIÆ SENNÆ, E. EXTRACTUM SENNÆ, L. D. Extract of senna.

Made like other extracts that have been mentioned. Dose 10 to 30 grains. Not much used.

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g. PULVIS SENNÆ COMPOSITUS, L. Compound powder of senna.

550 Compound powder of senna.

Composed of senna, crystals of tartar, each two ounces, scammony half an ounce, and ginger two drams. Dose two or three scruples.

551 Logwood.

128. HÆMATOXYLON CAMPECHIANUM, E. HÆMATOXYLON, L. D. LIGNUM CAMPECHENESE. Logwood. See BOTANY, p. 183.

Officinal Preparation.

552 Extract of logwood.

a. EXTRACTUM HÆMATOXYLI, L. Extract of logwood.

Made by boiling logwood in successive portions of water, and evaporating the mixed liquors to a proper consistence. Dose a scruple to two scruples.

553 Mahogany bark.

129. SWIETENIA MAHAGONI, E. Mahogany tree bark.

554 Febrifuge swietenia.

130. SWIETENIA FEBRIFUGA, E. Febrifuge Swietenia bark.

These barks are good tonics, and may be used instead of the cinchona.

555 Guaiacum.

131. GUAIACUM OFFICINALE, E. GUAIACUM, L. D. Guaiacum wood, bark and resin. See BOTANY, p. 181.; and for an excellent account of the nature and chemical properties of the resin, see Phil. Trans. for 1806. p. 89.

Officinal Preparations.

556 Compound decoction of guaiacum.

a. DECOCTUM GUAIACI COMPOSITUM, E. Compound decoction of guaiacum. *Decoction of the woods.*

Made by boiling three ounces of guaiacum raspings, and two ounces of stoned resins, in ten pounds of water to five pounds; adding, towards the end, of sliced sassafras and bruised liquorice root, each an ounce.

Given as a diet drink in cutaneous eruptions and rheumatism, to the extent of a pint in the day.

557 Tincture of guaiacum.

b. TINCTURA GUAIACI OFFICINALIS, E. Tincture of guaiacum.

Made by digesting a pound of powdered resin of guaiacum in two pounds and a half of alcohol for ten days, and filtering.

A good diaphoretic. Dose, two or three drams mixed with honey or syrup.

558 Ammoniated tincture of guaiacum.

c. TINCTURA GUAIACI AMMONIATA, E. TINCTURA GUAIACI VOLATILIS, D. TINCTURA GUAIACI, L. Ammoniated tincture of guaiacum.

the case, we here make a general reference to Woodville's "Medical Botany," Lewis's "Experimental History," Duncan's "New Dispensatory," the "Practical Synopsis," and "*Thesaurus Medicaminum.*

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This is made by digesting four ounces of powdered resin of guaiacum in about one pound and a half of ammoniated alcohol for seven days (three days L.), and filtering.

More stimulant than the last. Dose one or two drams.

559 Rue. 132. RUTA GRAVEOLENS, E. RUTA, L. D. Rue. See BOTANY, p. 182.

Officinal Preparations.

560 Volatile oil of rue. *a.* OLEUM VOLATILE RUTÆ, D. Volatile oil of rue.

Distilled as other volatile oils. Used chiefly as an anthelmintic. Dose from three to six drops.

561 Extract of rue. *b.* EXTRACTUM RUTÆ GRAVEOLENTIS, E. EXTRACTUM RUTÆ, L. D. Extract of rue.

Made like other watery extracts. Dose about one scruple.

562 Simarouba. 133. QUASSIA SIMARUBA, E. SIMAROUBA, L. D. Simarouba, or mountain damson bark.

Used as a tonic in dysentery, obstinate diarrhœa, indigestion, and intermittent fevers. Dose about a dram in substance, or two drams in the form of decoction, which is the better mode of exhibition.

563 Quassia. 134. QUASSIA EXCELSA, E. QUASSIA, L. Quassia wood, bark, and root.

A strong bitter, and good tonic, generally given by way of infusion, in the proportion of one to two drams to a pint of water.

564 Yellow-flowered rhododendron 135. RHODODENDRON CHRYSANTHUM, E. Yellow-flowered rhododendron. See BOTANY, p. 184. and Duncan's Dispensatory.

565 Whortle-berry. 136. ARBUTUS UVA URSI, E. UVA URSI, L. D. Whortle-berry. See BOTANY, p. 184.

566 Storax. 137. STYRAX OFFICINALE, E. STYRAX, L. STYRAX CALAMITA, D. Storax. See BOTANY, p. 184. and CHEMISTRY, N° 2481.

Officinal Preparation.

567 Purified storax. *a.* STYRAX PURIFICATA, L. D. Purified storax.

Storax is purified by dissolving it in rectified spirit, straining the solution, and reducing it to a proper thickness by a gentle heat.

Employed chiefly as an ingredient in a tincture to be mentioned immediately.

568 Benzoin. 138. STYRAX BENZOIN, E. BENZOE, L. BENZOINUM. D. Benzoin or benjamim. See BOTANY, p. 184. and CHEMISTRY, N° 2480.

Officinal Preparations.

569 Compound tincture of benzoin. *a.* TINCTURA BENZOES COMPOSITA, E. L. BALSAMUM TRAUMATICUM. Compound tincture of benzoin. *Traumatic vulnerary*, or *friars balsam.*

Prepared by digesting three ounces of powdered benzoin (two ounces of strained storax, L.) an ounce of balsam of Tolu, and half an ounce of powdered socotorine aloes, in two pounds of alcohol, for seven days (or three days, L.), and straining. History of Simple and Officinal Medicines.

This tincture forms a good expectorant, made into an emulsion with honey; and it has been long, though perhaps undeservedly, celebrated, as an external application to wounds.

570 Benzoic acid. *b.* ACIDUM BENZOICUM, E. SAL BENZOINI, D. FLORES BENZOES, L. Benzoic acid. *Salt of Benzoin. Flowers of benjamin.*

The Edinburgh process for obtaining this acid is, to triturate 24 ounces of benzoin with eight ounces of carbonate of soda; to boil this mixture in 16 pounds of water, constantly stirring, straining the decoction; repeat the boiling with six pounds of more water, straining, mixing the two decoctions, and evaporating till only two pounds remain, filtering again, and dropping into the fluid diluted sulphuric acid as long as there is any precipitation; then dissolving the precipitated acid in boiling water, straining the solution through linen, and setting it aside to crystallize; and, lastly, washing the crystals with cold water, and drying them.

For other methods of procuring this acid, and for an account of its chemical properties, See CHEMISTRY, N° 714 *et seq.*

Benzoic acid is employed as an expectorant, in a dose of a grain or two.

571 Balsam of copaiva. 139. COPAIFERA OFFICINALIS, E. BALSAMUM COPAIVA, L. BALSAMUM COPAIBA, D. Balsam of COPAIVA. See BOTANY, p. 185.

Order 2. DIGYNIA.

572 Clove julyflower. 140. DIANTHUS CARYOPHYLLUS, E. CARYOPHYLLUM RUBRUM, L. D. Clove julyflower. See BOTANY, p. 196.

Officinal Preparations.

573 Syrup of clove julyflower. *a.* SYRUPUS DIANTHÆ CARYOPHYLLÆ, E. SYRUPUS CARYOPHYLLI RUBRI, L. Syrup of clove julyflower.

Made by macerating a pound or two of the petals of clove julyflowers fresh gathered, and freed from the heels, in four pounds or six pints of boiling water for 12 hours in a glass vessel, straining the infusion, and adding of double refined sugar, seven pounds, or as much as is sufficient to form a syrup.

Order 4. PENTAGYNIA.

574 Wood sorrel. 141. OXALIS ACETOSELLA. LUJULA, L. ACETOSELLA, D. Wood sorrel. See BOTANY, p. 187.

Officinal Preparations.

575 Conserve of wood sorrel. *a.* CONSERVA ACETOSELLÆ, D. Conserve of wood sorrel.

Made by beating the leaves of wood sorrel in a marble mortar with a wooden pestle, first by themselves, and then with three times their weight of double refined sugar, till they are thoroughly combined.

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Class XI. DODECANDRIA. Order 1. MONOGYNIA.

576 Asarabacca.

142. Asarum Europæum, E. ASARUM, L. D. Asarabacca. See Botany, p. 190.

Officinal Preparations.

577 Compound powder of asarabacca.

a. Pulvis Asari compositus, E. L. D. Compound powder of asarabacca.

Prepared according to the London and Dublin process, of equal parts of asarabacca, sweet marjoram, Syrian herb mastich, and lavender, dried and reduced together to a fine powder. In the Edinburgh formula there are used three parts of asarabacca, one of marjoram, and one of the lavender.

Used as an errhine.

578 White canella.

143. Canella alba, E. L. D. See Botany, p. 190.

Class XII. ICOSANDRIA. Order 1. MONOGYNIA.

579 Cloves.

144. Eugenia Caryophyllata. CARYOPHYLLUS AROMATICUS, E. CARYOPHYLLA AROMATICA, D. Clove tree, and its essential oil. See Woodville's Botany, and Duncan's Dispensatory.

580 Pimento.

145. Myrtus Pimenta, E. PIMENTO, L. D. Pimento, *Jamaica pepper*, or *allspice*. See Botany, p. 194.

Officinal Preparations.

581 Pimento water.

a. Aqua Myrtæ Pimentæ, E. AQUA PIMENTO, L. Pimento water.

A gallon of water distilled from half a pound of pimento. Dose, a small wine glass full.

582 Volatile oil of pimento.

b. Oleum volatile Myrti Pimentæ, E. Volatile oil of pimento.

Distilled as other volatile oils. Given as a stimulus in a dose of two or three drops.

583 Spirit of pimento.

c. Spiritus Myrti Pimentæ, E. SPIRITUS PIMENTO, L. D. Spirit of pimento.

A gallon of proof spirit distilled from half a pound of bruised pimento. Dose about an ounce.

584 Pomegranate.

146. Punica granatum, E. GRANATUM, L. D. Pomegranate. See Botany, p. 195.

585 Kino.

147. Eucalyptus resinifera. KINO, E. L. D. Kina. See Duncan's Dispensatory.

Officinal Preparation.

586 Tincture of kino.

a. Tinctura Kino, E. D. Tincture of kino.

Prepared by digesting two ounces of powdered kino in a pound and a half of diluted alcohol, for seven days, and filtering. Dose from one dram to three, as an astringent.

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148. Amygdalus communis, E. AMYGDALÆ DULCES, L. D. AMYGDALÆ AMARÆ, L. Sweet and bitter almonds. See Botany, p. 195.

Officinal Preparations.

587 Sweet and bitter almonds.

a. Oleum Amygdali communis, E. OLEUM AMYGDALARUM, L. D. Oil of almonds.

588 Oil of almonds.

Expressed in the usual manner. Given as an emollient, *ad libitum*.

589 Almond emulsion.

b. Emulsio Amygdalæ communis, E. LAC AMYGDALÆ vel AMYGDALARUM, L. D. Almond emulsion.

Made by beating an ounce of blanched sweet almonds, or an ounce and a half, either by themselves, or with half an ounce of double refined sugar, and gradually pouring on them two pounds and a half or two pints of distilled water, to form an emulsion.

A grateful demulcent, that may be drunk in any quantity.

590 Prunes.

149. Prunus domestica, E. L. D. Prunes.

Used as a gentle laxative, chiefly in composition.

591 Sloes.

150. Prunus spinosa. PRUNUS SYLVESTRIS, L. Sloes.

Employed as an astringent.

Officinal Preparation.

592 Conserve of sloes.

a. Conserva Pruni sylvestris, L. Conserve of sloes.

Made by mixing any quantity of the pulp of sloes, obtained by boiling them in water till they are soft, and subsequent expression, with three times its weight of double refined sugar.

Order 4: Pentagynia.

593 Quince seeds.

151. Pyrus cydonia. CYDONIA MALUS, L. Quince seeds. See Botany, p. 197.

Officinal Preparation.

594 Mucilage of quince seeds.

a. Mucilago Seminum Cydonii mali, L. Mucilage of quince seed.

Made by boiling one dram of quince seeds in eight ounces of distilled water, with a slow fire for 10 minutes, and then squeezing the mucilage through linen.

Order 5. Polygynia.

595 Red rose.

152. Rosa Gallica, E. ROSA RUBRA, L. D. Red rose buds. See Botany, p. 198.

Officinal Preparations.

596 Infusion of roses.

a. Infusum Rosæ gallicæ, E. INFUSUM ROSÆ, L. INFUSUM ROSARUM, D. Infusion of red roses.

Prepared by infusing one ounce of the dried petals of red

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red roses, in about two pounds and a half of boiling water, in a glass or unglazed earthen vessel, till cold, then adding about half a dram of sulphuric acid, and about two ounces of double refined sugar.

A pleasant refrigerant and gentle astringent, given internally in hemorrhages, and much employed as a gargle.

597 Syrup of red roses.

b. SYRUPUS ROSÆ GALLICÆ, E. Syrup of red roses.

Made by macerating seven ounces of the dried petals of red roses in five pounds of boiling water for 12 hours, straining the liquor, and adding six pounds of double refined sugar to make a syrup.

598 Honey of roses.

c. MEL ROSÆ, L. D. Honey of roses.

Made by macerating four ounces of dried petals of red rose buds in three pints of boiling distilled water, for six hours, then straining the liquor, and boiling it with five pounds of clarified honey to the consistence of a syrup.

599 Conserve of roses.

d. CONSERVA ROSÆ RUBRÆ, L. CONSERVA ROSÆ, D. Conserve of roses.

Made by beating the fresh petals of red roses with three times their weight of double refined sugar till they are thoroughly mixed.

600 Damask rose.

153. ROSA DAMASCENA, L. D. ROSA CENTIFOLIA, E. The damask rose. See BOTANY, p. 198.

Officinal Preparations.

601 Rose water.

a. AQUA ROSÆ CENTIFOLIÆ, E. AQUA ROSÆ, L. D. Rose water.

A gallon of water distilled from six pounds of the fresh petals of damask roses.

Chiefly employed as a perfume.

602 Syrup of damask roses.

b. SYRUPUS ROSÆ CENTIFOLIÆ, E. SYRUPUS ROSÆ, L. Syrup of damask roses.

Made by macerating one pound (E.) or seven ounces (L.) of the fresh petals of damask roses, in four pounds or four pints of boiling distilled water, and adding to the strained liquor three pounds (E.) or six pounds (L.) of double refined sugar, to make a syrup.

603 Hips.

154. ROSA CANINA, E. CYNOSBATUS, L. Hips. See BOTANY, p. 198.

Officinal Preparation.

604 Conserve of hips.

a. CONSERVA ROSÆ CANINÆ, E. CONSERVA CYNOSBATI, L. Conserve of hips.

Made by beating any quantity of the pulp of ripe hips with three times its weight of double refined sugar.

605 Raspberries.

155. RUBUS IDÆUS, L. D. Raspberry. See BOTANY, p. 198.

Officinal Preparation.

606 Syrup of raspberries.

a. SYRUPUS FRUCTUS RUBI IDÆI, L. Syrup of raspberry juice.

Made by boiling the juice of raspberry with a sufficient quantity of double refined sugar to make a syrup.

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156. TORMENTILLA ERECTA, E. TORMENTILLA, L. D. Tormentil root. See BOTANY, p. 199.

607 Tormentil root.

157. POTENTILLA REPTANS. PENTAPHYLLUM, L. Common cinquefoil. See BOTANY, p. 199.

608 Common cinquefoil.

158. GEUM URBANUM. Avens or *herb bennet.* See BOTANY, p. 199. and the "Practical Synopsis."

609 Avens.

This is considered as a good substitute for cinchona.

CLASS XIII. POLYANDRIA. Order 1. MONOGYNIA.

159. PAPAVER RHOEAS. PAPAVER ERRATICUM, L. Common red poppy. See BOTANY, p. 204.

610 Common red poppy.

Officinal Preparation.

611 Syrup of red poppy.

a. SYRUPUS PAPAVERIS ERRATICI, L. Syrup of red poppy.

Four pounds of the fresh flowers of red poppy are gradually mixed with four pints and a half of boiling distilled water in a water bath, constantly stirring them; they are then suffered to macerate for 12 hours, the juice is pressed out and boiled with double refined sugar into a syrup.

Generally added to narcotic draughts, juleps, &c.

612 White poppy.

160. PAPAVER SOMNIFERUM, E. PAPAVER ALBUM, L. D. White poppy. *Opium.* See BOTANY, p. 204.

To dilate on any article, however important, is now out of our power; we must therefore, besides the above reference, refer our readers for the best accounts of opium, to Dr Crumpe's "Inquiry," Dr Duncan's Dispensatory, the "Practical Synopsis," and *Thesaurus Medicaminum.*

Officinal Preparations.

613 Purified opium.

a. OPIUM PURIFICATUM, L. D. Purified opium.

A pound of opium, cut into small pieces, is digested with 12 pints of proof spirit, with a gentle heat, till as much as possible of the opium is dissolved. The tincture is then filtered and distilled to a consistence proper for making into pills or beating to powder.

Purified opium is commonly considered as rather weaker than crude opium; two grains of the softer mass, and one grain and a half of the harder, being an ordinary dose.

614 Opiate powder.

b. PULVIS OPIATUS, E. L. Opiate powder.

By the London process this is formed by mixing together a dram of hard purified opium in powder, and nine drams of burnt and prepared hartshorn. The Edinburgh powder is prepared of one part of opium, and nine parts of prepared carbonate of lime, rubbed together to a very fine powder.

Ten grains of these powders contain one grain of opium; but the Edinburgh powder is rather the stronger.

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er. They are useful when it is required to administer opium in very small doses.

615 Opiate pills.

c. PILULÆ OPII, L. PILULÆ OPIATÆ, E. Opium pills. *Opiate* or *thebaic pills.*

The London pills are prepared of two drams of hard purified opium in powder, and one ounce of extract of liquorice, beaten together till they are perfectly united. The Edinburgh pills are formed of one part of opium, and seven of extract of liquorice, softened separately with diluted alcohol, beaten into a pulp and mixed, and then beaten with two parts of pounded Jamaica pepper into an uniform mass.

The London pills contain two grains of opium, and the Edinburgh one grain, in 10 of the mass.

616 Extract of opium.

d. EXTRACTUM OPII, D. Extract of opium.

Prepared by dissolving two ounces of purified opium in one pound of boiling water, straining the liquor, and adding, while warm, one pound of cold distilled water, exposing to the air for two days, filtering again, and evaporating to the proper consistence of an extract.

617 Troches of liquorice with opium.

e. TROCHISCI GLYCYRRHIZÆ CUM OPIO, E. TROCHISCI GLYCYRRHIZÆ COMPOSITI, D. Troches of liquorice with opium. *Compound troches of liquorice.*

The Edinburgh troches are formed by triturating two drams of opium, with half an ounce of tincture of tolu; then adding by degrees five ounces of extract of liquorice, softened in warm water, and eight ounces of common syrup; and lastly, five ounces of powdered gum arabic, and drying the mass till it is of a consistence to form troches, weighing ten grains each. The Dublin formula directs two drams of purified opium to be triturated with a dram of balsam of Peru, and three drams of tincture of myrrh, till they are intimately mixed; then to be added two drams of tincture of tolu, and nine ounces of extract of liquorice, softened in warm water; when the whole is to be well beaten together, and, with the addition of five ounces of powdered gum arabic, formed into troches, weighing ten grains each.

These troches are intended to allay irritation in tickling coughs. About seven and a half of the Edinburgh, and six of the Dublin troches, contain about one grain of opium.

618 Opiate electuary.

f. ELECTUARIUM OPIATUM, E. CONFECTIO OPIATA, L. Opiate electuary. *Opiate confection.*

The Edinburgh electuary is formed by mixing together six ounces of aromatic powder, three ounces of finely powdered snakeroot, half an ounce of opium, diffused in a sufficient quantity of Spanish white wine, and one pound of the syrup of ginger. The London confection is prepared of six drams of hard purified opium in powder; of long pepper, ginger, and caraway seeds powdered, each two ounces; and syrup of white poppy boiled to the consistence of honey, three times the weight of the other ingredients. The opium is first mixed with the syrup, then the other powders added, and the whole intimately blended.

These are intended as stimulating compositions of opium. Thirty-six grains of the London, and 43 of the Edinburgh preparation, contain about one grain of opium.

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g. ELECTUARUM MIMOSÆ CATECHU, E. ELECTUARIUM CATECHU COMPOSITUM, D. CONFECTIO JAPONICA. Electuary of catechu. *Japonic confection.* 619 Electuary of catechu.

These electuaries are prepared of four ounces of extract of catechu powdered, three ounces powdered kino, one ounce of cinnamon, and the same of nutmeg in powder, one dram and a half of opium, diffused in Spanish white wine, and two pounds and a quarter of syrup of red roses boiled to the consistence of honey (E.); or 14 ounces of syrup of ginger, and the same of the syrup of orange peel, boiled to the consistence of honey (D.).

Powerful astringents, given in diarrhœas. Ten scruples contain about one grain of opium, and the usual dose is a tea spoonful frequently repeated.

620 Tincture of opium.

h. TINCTURA OPII, E. L. D. TINCTURA THEBAICA. Tincture of opium. *Thebaic tincture. Liquid laudanum.*

The Edinburgh and Dublin tinctures are made by digesting two ounces of opium in two pounds of diluted alcohol, 14 days, and filtering. The London tincture is made by digesting ten drams of powdered purified opium in a pint of proof spirit for ten days.

These tinctures are considered as of nearly equal strength. Dose as narcotics, 25 or 30 drops; as antispasmodics, they are, like the solid opium, given in much larger doses.

621 Camphorated tincture of opium.

i. TINCTURA OPII CAMPHORATA, L. D. ELIXIR PAREGORICUM. Camphorated tincture of opium. *Paregoric elixir.*

Prepared by digesting one dram of hard purified opium, one dram of flowers of benzoin, two scruples of camphor, and one dram of essential oil of aniseeds, in two pints of proof spirit, for ten days.

Half an ounce of this tincture contains about one grain of opium. Usual dose about one dram or two.

622 Ammoniated tincture of opium.

k. TINCTURA OPII AMMONIATA. Olim ELIXIR PAREGORICUM, E. Ammoniated tincture of opium.

Made by digesting three drams of benzoic acid, three drams of sliced saffron, two drams of opium, and half a dram of volatile oil of aniseeds, in ten ounces of ammoniated alcohol, seven days, in a close vessel.

An excellent antispasmodic, stronger than the last. Dose about one dram.

623 Syrup of opium.

l. SYRUPUS OPII, D. Syrup of opium.

Made by dissolving 48 grains of extract of opium in three pounds of boiling water, and adding a sufficient quantity of double refined sugar to make a syrup.

An excellent narcotic for children. According to Dr Duncan, an ounce of it contains about two grains and a half of opium.

624 Syrup of white poppies.

m. SYRUPUS PAPAVERIS SOMNIFERI, E. SYRUPUS PAPAVERIS ALBI, L. Syrup of white poppies.

The Edinburgh syrup is made by macerating two pounds

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pounds of sliced white poppy heads, freed from the seeds, in 30 pounds of boiling distilled water for 12 hours, boiling it to a third, and pressing out the liquor, which is again boiled to one half, strained, and formed into a syrup with four pounds of double refined sugar. The proportions in the London process are, three pounds and a half of poppy heads, eight gallons of water, and six pounds of sugar.

A weak narcotic, not so certain as the last syrup.

625 Ladanum. 161. CISTUS CRETICUS, LADANUM, L. Ladanum. See CHEMISTRY, N° 2466.

Officinal Preparation.

626 Compound ladanum plaster. *a.* EMPLASTRUM LADANI COMPOSITUM, L. Compound ladanum plaster.

Formed of three ounces of ladanum, one ounce of frankincense, powdered cinnamon and expressed oil of mace, each half an ounce, and one dram of essential oil of mint.

A warm stimulating plaster.

Order 3. TRIGYNIA.

627 Stavesacre. 162. DELPHINIUM STAPHISAGRIA. STAPHISAGRIA, L. D. Stavesacre.

Employed as an external application against vermin.

628 Blue monkshood 163. ACONITUM NEOMONTANUM. ACCONITUM NAPELLUS, E. ACONITUM, L. D. Blue monkshood, or aconite. See *Duncan's Dispensatory.*

Officinal Preparations.

629 Inspissated juice of aconite. *a.* SUCCUS SPISSATUS ACONITI NAPELLI, E. Inspissated juice of aconite.

Made from the fresh leaves of aconite in the usual manner. Dose from half a grain to three grains, twice or thrice a day.

Order 4. TETRAGYNIA.

630 Winter's bark. 164. WINTERIA AROMATICA, E. Winter's bark. Similar to canella alba.

Order 6. POLYGYNIA.

631 Black hellebore. 165. HELLEBORUS NIGER, E. L. D. MELAMPODIUM. Black hellebore. See BOTANY, p. 210.

Officinal Preparation.

632 Tincture of black hellebore. *a.* TINCTURA HELLEBORI NIGRI, E. L. D. Tincture of black hellebore.

Prepared by digesting four ounces of black hellebore, and about half a dram of powdered cochineal, in two pounds and a half (E.), or two pints (L.), or two pounds (D.), of diluted alcohol, for about a week.

Much celebrated as an emmenagogue. Dose about a tea spoonful.

633 Stinking hellebore. 166. HELLEBORUS FOETIDUS. HELLEBORASTEC, L. Stinking hellebore. See BOTANY, p. 210.

CLASS XIV. DIDYNAMIA. Order 1. GYMNOSPERMIA.

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167. HYSSOPUS OFFICINALIS, E. HYSSOPUS, D. Hyssop. See BOTANY, p. 216. 634 Hyssop.

168. MENTHA VIRIDIS. MENTHA SATIVA, L. D. Spearmint. See BOTANY, p. 217. 635 Spearmint

Officinal Preparations.

a. AQUA MENTHÆ SATIVÆ, L. D. Mint water. 636 Mint water.

A gallon of water distilled from a pound and a half of mint.

b. OLEUM VOLATILE MENTHÆ SATIVÆ, L. D. Volatile oil of mint. 637 Oil of mint.

Distilled as other volatile oils.

c. SPIRITUS MENTHÆ SATIVÆ, L. Spirit of mint.

A gallon of spirit distilled from a pound and a half of mint.

169. MENTHA PIPERITA, E. MENTHA PIPERIS, L. D. Peppermint. See BOTANY, p. 217. 638 Peppermint.

Officinal Preparations.

a. AQUA MENTHÆ PIPERITÆ, L. AQUA MENTHÆ PIPERITIDIS, L. Peppermint water. 639 Peppermint water.

b. OLEUM VOLATILE MENTHÆ PIPERITÆ; vel PIPERITIDIS, E. L. D. Oil of peppermint. 640 Oil of peppermint.

c. SPIRITIS MENTHÆ PIPERITÆ vel PIPERITIDIS, E. L. Spirit of peppermint. 641 Spirit of peppermint.

All these are prepared in the same manner as similar preparations of mint, possess similar properties, but rather stronger. Dose of the water, a wine glass full; of the oil a drop or two; of the spirit, about an ounce.

170. MENTHA PULEGIUM, E. PULEGIUM, L. D. Pennyroyal. See BOTANY, p. 217. 642 Pennyroyal.

Officinal Preparations.

a. AQUA MENTHÆ PULEGII, E. AQUA PULEGII, L. D. Pennyroyal water. 643 Pennyroyal water

b. OLEUM VOLATILE MENTHÆ PULEGII, E. OLEUM PULEGII, L. D. Oil of pennyroyal. 644 Oil of penny royal.

c. SPIRITUS MENTHÆ PULEGII, E. SPIRITUS PULEGII, L. Spirit of pennyroyal. 645 Spirit of pennyroyal.

Distilled in the same manner, and possessing similar properties with the preparations of mint.

171. LAVENDULA SPICA, E. LAVENDULA, L. D. Lavender flowers. See BOTANY, p. 216. 646 Lavender flowers.

Officinal Preparations.

a. OLEUM VOLATILE LAVANDULÆ SPICÆ, E. OLEUM 647 Oil of lavender.

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LEUM VOLATILE LAVENDULÆ. Volatile oil of lavender.

Distilled as other volatile oils.

648 Spirit of lavender.

b. SPIRITUS LAVANDULÆ SPICÆ, E. SPIRITUS LAVENDULÆ, L. D. Spirit of lavender.

Two pounds of fresh flowering spikes of lavender to eight pounds of alcohol, and seven pounds drawn off, (E.). A pound and a half of lavender to a gallon (L.) or nine pounds (D.) of proof spirit, and five pints (L.) or five pounds (D.) drawn off.

A powerful stimulus, seldom employed internally, except in the following preparation.

649 Compound tincture of lavender.

c. SPIRITUS LAVANDULÆ SPICÆ COMPOSITUS, E. SPIRITUS LAVENDULÆ COMPOSITUS, L. TINCTURA LAVENDULÆ COMPOSITA, D. Compound spirit of lavender. *Compound tincture of lavender.*

Made by digesting an ounce (or half an ounce, L. D.) of bruised cinnamon, half an ounce of bruised nutmegs, (two drams of bruised cloves, E.) and three drams (or an ounce L.) of red sanders shavings, in three pounds (or three pints L.) of spirit of lavender, and a pound (or a pint L.) of spirit of rosemary, for about a week.

An excellent cordial in faintness or nausea. Dose from 20 drops to a dram.

650 Syrian herb mastich.

172. TEUCRIUM MARUM. MARUM SYRIACUM, L. D. Syrian herb mastich. See BOTANY, p. 216.

651 Water germander.

173. TEUCRIUM SCORDIUM. SCORDIUM, L. Water germander. See BOTANY, p. 216.

652 White horehound.

176. MARRUBIUM VULGARE, E. L. D. White horehound. See BOTANY, p. 218.

653 Origanum.

177. ORIGANUM VULGARE. ORIGANUM, L. D. *Origanum*, or *wild marjoram*. See BOTANY, p. 218.

Officinal Preparation.

654 Oil of origanum.

a. OLEUM ORIGANI, L. D. Oil of origanum.

Distilled as other volatile oils. Much used in toothach.

655 Sweet marjoram.

178. ORIGANUM MAJORANA, E. MAJORANA, L. D. Sweet marjoram. See BOTANY, p. 219.

656 Balm.

179. MELISSA OFFICINALIS, E. MELISSA, L. Balm. See BOTANY, p. 219.

Order 2. ANGIOSPERMIA.

657 Foxglove.

180. DIGITALIS PURPUREA, E. DIGITALIS, L. D. Foxglove. See BOTANY, p. 221. See also Withering on Foxglove, Duncan's Dispensatory, the Practical Synopsis, and the *Thesaurus Medicaminum*.

Dose of the digitalis in substance about one grain, gradually increased.

Officinal Preparations.

658 Infusion of foxglove.

a. INFUSUM DIGITALIS PURPUREÆ, D. Infusion of foxglove.

Made by macerating a dram of the dried leaves of foxglove in eight ounces of boiling water, with an ounce of spirit of cinnamon, for four hours, and filtering.

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Used principally in dropsical complaints. Dose half an ounce, or one ounce, twice a-day.

659 Tincture of foxglove.

b. TINCTURA DIGITALIS PURPUREÆ, E. Tincture of foxglove.

Prepared by digesting an ounce of the dried leaves of foxglove in eight ounces of diluted alcohol, for seven days, and straining through paper.

Much recommended in hæmoptysis, and the early stages of consumption, to diminish the frequency of the pulse. Dose from 10 to 20 drops, twice or thrice a day, gradually and cautiously increased.

CLASS XV. TETRADYNAMIA. Order 1. SILICULOSÆ.

660 Garden scurvygrass.

181. COCHLEARIA OFFICINALIS, E. COCHLEARIA, D. COCHLEARIA HORTENSIS, L. Garden scurvygrass. See Botany, p. 225.

Officinal Preparation.

661 Compound juice of scurvygrass.

a. SUCCUS COCHLEARIÆ COMPOSITUS, E. L. Compound juice of scurvygrass.

According to the Edinburgh process, this is prepared by mixing juice of scurvygrass, juice of water cresses, both fresh gathered, and juice of Seville oranges, of each two pounds, with half a pound of spirit of nutmeg; and after the feces have subsided, straining the liquor. The London preparation is composed of two pints of juice of scurvygrass, one pint of the juice of brooklime, and the same of that of water cresses, and 20 ounces by measure of Seville orange juice, mixed and strained as before.

A celebrated remedy in the scurvy, and cutaneous eruptions. Dose from one to four ounces, twice or thrice a-day.

662 Horse-radish root.

182. COCHLEARIA ARMORACIA, E. RAPHANUS RUSTICANUS, L, D. Horse-radish root. See BOTANY, p. 226.

Officinal Preparation.

663 Compound spirit of horse-radish.

a. SPIRITUS RAPHANI COMPOSITUS, L. D. Compound spirit of horse-radish.

Two gallons or 18 pounds (D.) of proof spirit distilled from fresh horse-radish root, and dried Seville orange peel, of each two pounds; fresh garden scurvygrass four pounds, and bruised nutmegs an ounce.

Formerly much celebrated as an antiscorbutic, and stimulant. Dose from half an ounce to an ounce.

Order 2. SILIQUOSÆ.

664 Ladies smock.

183. CARDAMINE PRATENSIS, E. CARDAMINE, L. Ladies smock. See BOTANY, p. 226.

665 White mustard seed.

183. SINAPIS ALBA, E. SINAPIS, D. White mustard seed.

666 Common mustard seed.

184. SINAPIS NIGRA. SINAPIS, L. Common mustard seed. See BOTANY, p. 228.

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Officinal Preparation.

667 Mustard cataplasm.

a. CATAPLASMA SINAPEOS, L. CATAPLASMA SINAPIUM, D. Mustard cataplasm, or sinapism.

Prepared of equal parts of powdered mustard and crumb of bread, made into a proper consistence with vinegar.

An excellent external stimulant application, in the low stage of acute diseases, and in other cases where slight external inflammation is indicated.

668 Water cresses.

185. SISYMBRIUM NASTURTIUM, E. NASTURTIUM AQUATICUM, L. D. Water cresses. See BOTANY, p. 226.

CLASS XVI. MONADELPHIA. Order 1. TRIANDRIA.

669 Tamarinds.

186. TAMARINDUS INDICA, E. TAMARINDUS, L. D. Tamarinds. See BOTANY, p. 231.

Order 8. POLYANDRIA.

670 Common mallow.

187. MALVA SYLVESTRIS, E. MALVA, L. Common mallow. See BOTANY, p. 233.

Officinal Preparation.

671 Decoction for clysters.

a. DECOCTUM PRO ENEMATE, L. Decoction for clysters.

Made by boiling one ounce of the dried leaves of mallow, and one ounce and a half of dried chamomile flowers, with a pint of water, and straining.

672 Marshmallow.

188. ALTHÆA OFFICINALIS, E. ALTHÆA, L. Marshmallow root. See BOTANY, p. 233.

Officinal Preparations.

673 Decoction of marshmallow.

a. DECOCTUM ALTHÆÆ OFFICINALIS, E. Decoction of marshmallow.

Made by boiling four ounces of dried marshmallow root bruised, and two ounces of stoned raisins of the sun, in seven pounds of water to five pounds, straining, and when the feces have subsided, pouring off the clear liquor.

A good emollient drink in inflammatory diseases.

674 Syrup of marshmallow.

b. SYRUPUS ALTHÆÆ OFFICINALIS, E. SYRUPUS ALTHÆÆ, L. Syrup of marshmallow.

Made by boiling one pound of fresh marshmallow root, sliced or bruised, in ten pounds or a gallon of water, to one half, and adding four pounds of double refined sugar to make a syrup.

A good emollient and demulcent in coughs, &c.

CLASS XVII. DIADELPHIA. Order 2. HEXANDRIA.

675 Common fumitory.

189. FUMARIA OFFICINALIS. FUMARIA, D. Common fumitory. See BOTANY, p. 237.

Order 3. OCTANDRIA.

190. POLYGALA SENEGA, E. SENEKA, L. D. Seneka rooot. See BOTANY, p. 237. 676 Seneka root.

Officinal Preparation.

677 Decoction of seneka.

a. DECOCTUM POLYGALÆ SENEGÆ E. Decoction of seneka.

Made by boiling one ounce of seneka root in two pounds of water to 16 ounces, and straining.

Used in dropsy and rheumatic or arthritic complaints, and lately recommended in croup. Dose about two ounces, three or four times a-day.

Order 4. DECANDRIA.

678 Red sanders wood.

191. PTEROCARPUS SANTALINUS, E. SANTALUM RUBRUM, L. D. Red sanders wood.

Employed chiefly to give colour to a tincture.

679 Dragon's blood.

192. PTEROCARPUS DRACO, E. SANGUIS DRACONIS, L. Dragon's blood. See CHEMISTRY, N° 2467.

Employed as an astringent, but now seldom used.

680 Common broom.

193. SPARTIUM SCOPARIUM, E. GENISTA, L. D. Common broom tops. See BOTANY, p. 237.

Officinal Preparation.

681 Extract of broom.

a. EXTRACTUM GENISTÆ, L. Extract of broom.

Employed as a diuretic.

682 Cowhage.

194. DOLICHOS PRURIENS, E. DOLICHOS, D. Cowhage, or *cow-itch*. See BOTANY, p. 239.

683 Gum tragacanth.

195. ASTRAGALUS TRAGACANTHA, E. TRAGACANTHA, L. D. Gum tragacanth, or gum dragant.

This gum is a mere mucilage, and is employed as a demulcent.

Officinal Preparations.

684 Mucilage of gum tragacanth.

a. MUCILAGO ASTRAGALI TRAGACANTHÆ, E. MUCILAGO TRAGACANTHÆ, L. MUCILAGO GUMMI TRAGACANTHÆ, D. Mucilage of gum tragacanth.

Made by macerating one ounce of powdered gum tragacanth in eight ounces of boiling water (E.), or half an ounce in ten ounces (L.), or one dram in eight ounces (D.), and dissolving by subsequent trituration.

685 Compound powder of tragacanth.

b. PULVIS TRAGACANTHÆ COMPOSITUS, L. Compound powder of tragacanth.

Prepared of powdered gum tragacanth, gum arabic, and starch, of each half an ounce, rubbed into a powder with three ounces of double refined sugar.

A demulcent powder, serviceable in tickling coughs, strangury, ardor urinæ, violent mucous diarrhœa, and similar diseases.

686 Liquorice root.

196. GLYCYRRHIZA GLABRA, E. GLYCYRRHIZA,

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RHIZA, L. D. Liquorice root and extract of liquorice.

Used as an emollient and demulcent, in substance, in decoction, pills, electuaries, &c.

Officinal Preparation.

687 Extract of liquorice.

a. EXTRACTUM GLYCYRRHIZÆ GLABRÆ, E. EXTRACTUM GLYCYRRHIZÆ, L. D. Extract of liquorice.

Prepared like other watery extracts.

688 Cabbage-tree bark.

197. GEOFFRÆA INERMIS, E. GEOFFRÆA, D. Cabbage-tree bark.

Lately introduced into this country from the West Indies as an anthelmintic, in the form of decoction.

Officinal Preparation.

689 Decoction of cabbage-tree bark.

a. DECOCTUM GEOFFRÆÆ INERMIS, E. Decoction of cabbage-tree bark.

Made by boiling one ounce of powdered cabbage-tree bark with a gentle fire in two pounds of water to one pound, and straining. Dose to children a table spoonful, to adults four; giving castor oil, and diluting with acidulated drinks, if unpleasant symptoms should arise.

690 Fenugreek seed.

198. TRIGONELLA FOENUM GRECUM. FOENUM GRECUM, L. Fenugreek seed. See BOTANY, p. 241.

CLASS XVIII. POLYADELPHIA. Order 3. ICOSANDRIA.

691 Seville orange.

199. CITRUS AURANTIUM, E. AURANTIUM HISPALENSE, L. D. Seville orange juice, peel, and leaves. See BOTANY, p. 243.

Officinal Preparations.

692 Syrup of orange peel.

a. SYRUPUS CITRI AURANTII, E. SYRUPUS CORTICIS AURANTII, L. D. Syrup of orange peel.

Prepared by macerating six ounces, or eight ounces (L. D.) of the fresh outer rind of Seville oranges, with three pounds or five pints (L. D.) of boiling water, for 12 hours in a close vessel, and adding to the filtered liquor of double refined sugar four pounds, or enough to make a syrup.

Used chiefly in composition.

693 Orange peel water.

b. AQUA CITRI AURANTII, E. Orange peel water.

Ten pounds of water distilled from two pounds of fresh orange peel, after due maceration.

A pleasant cordial water. Dose two or three ounces.

694 Tincture of orange peel.

c. TINCTURA AURANTII CORTICIS, L. D. Tincture of orange peel.

Made by digesting three ounces of fresh orange peel in two pints or two pounds of proof spirit for three days. Dose three or four drams to an ounce.

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d. CONSERVA CITRI AURANTII, E. CONSERVA AURANTII HISPALENSIS, L. CONSERVA CORTICIS AURANTII, D. Conserve of orange peel.

Prepared by beating the fresh rind of Seville oranges first by itself, and then with three times its weight of double refined sugar. 695 Conserve of orange peel

200. CITRUS MEDICA, E. LIMON, L. D. Lemon juice, peel, and essential oil. See BOTANY, p. 242. 696 Lemon.

Officinal Preparations.

a. AQUA CITRI MEDICÆ, E. Lemon peel water. 697 Lemon peel water.

A gallon of water distilled from two pounds of fresh lemon peel.

A pleasant aromatic water, similar to orange water.

b. SYRUPUS CITRI MEDICÆ, E. SYRUPUS LIMONIS SUCCI, L. D. Syrup of lemon juice. 698 Syrup of lemon juice.

Made by dissolving five parts (E.) or five pounds (L.) or four pounds (D.) of double refined sugar, in three parts or two pints (L.) or two pounds (D.) of filtered lemon juice.

A pleasant refrigerant syrup.

c. SUCCUS LIMONIS SPISSATUS, L. Inspissated lemon juice. 699 Inspissated lemon juice

Prepared in the same manner as the inspissated juice of elder berries.

Employed chiefly as a refrigerant, especially in bilious or remittent fevers.

Order 4. POLYANDRIA.

201. MELALEUCA LEUCODENDRON, E. CAJEPUTA. Cajeput oil. 700 Cajeput.

Used as an external stimulant in cases of luxation, sprains, and rheumatic and gouty affections.

202. HYPERICUM PERFORATUM. HYPERICUM, L. St John's wort. See BOTANY, p. 243, 701 St John's wort.

CLASS XIX. SYNGENESIA. Order 1. POLYGAMIA ÆQUALIS.

203. LEONTODON TARAXACUM, E. TARAXACUM, L. D. Dandelion root and leaves. 702 Dandelion.

Reputed a diuretic, but scarcely employed in modern practice.

204. LACTUCA VIROSA, E. Wild lettuce. See BOTANY, p. 248. and Duncan's Dispensatory. 703 Wild lettuce.

Officinal Preparation.

a. SUCCUS SPISSATUS LACTUCÆ VIROSÆ, E. Inspissated juice of wild lettuce. 704 Inspissated juice of wild lettuce.

Prepared as other inspissated juices; employed as a narcotic and diuretic, principally in dropsies proceeding from visceral obstructions. Dose at first about

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three grains, gradually increased to 15 or more, twice or thrice a-day.

705 Burdock root.

205. ARCTIUM LAPPA, E. BARDANA, L. D. Burdock root.

Recommended as a diuretic, and given in the form of decoction in dropsies, &c.

706 Artichoke leaves.

206. CYNARA SCOLYMUS, E. CINARA SCOLYMUS, E. D. Artichoke leaves.

Employed as a diuretic.

Order 2. POLYGAMIA SUPERFLUA.

707 Southernwood.

207. ARTEMISIA ABROTANUM. ABROTANUM, L. Southernwood. See BOTANY, p. 251.

Officinal Preparation.

708 Decoction for fomentation.

a. DECOCTUM PRO FOMENTO, L. Decoction for fomentations.

Prepared by boiling for a little, of the dried leaves of southernwood, the dried tops of sea wormwood, and dried chamomile flowers, each an ounce, with half an ounce of dried bay leaves, in six pints of distilled water, and straining.

709 Sea wormwood.

208. ARTEMISIA MARITIMA. ABSYNTHIUM MARITIMUM, L. D. Sea wormwood. See BOTANY, p. 251.

Officinal Preparation.

710 Conserve of sea wormwood.

a. CONSERVA ABSYNTHII MARITIMI, L. Conserve of sea wormwood.

Prepared by beating the fresh tops of sea wormwood with three times their weight of double refined sugar into a conserve.

Employed as a tonic and stomachic in hypochondriasis, epilepsy, &c. and as an anthelmintic. Dose two drams to half an ounce, twice or thrice a-day.

711 Worm seed.

209. ARTEMISIA SANTONICA, E. SANTONICUM, L. D. Worm seed.

Employed as an anthelmintic. Dose from half a dram to a dram, twice a-day, in powder.

712 Common wormwood.

210. ARTEMISIA ABSINTHIUM, E. ABSINTHIUM VULGARE, L. D. Common wormwood. See BOTANY, p. 251.

713 Tansy.

211. TANACETUM VULGARE, E. TANACETUM, L. D. Tansy, leaves and flowers. See BOTANY, p. 251.

A good tonic and anthelmintic. Dose half a dram to four drams in substance, or a table spoonful of the expressed juice.

714 Leopard's bane.

212. ARNICA MONTANA, E. L. D. German leopard's bane. See BOTANY, p. 253, and Duncan's Dispensatory.

715 Elecampane.

213. INULA HELENIUM. INULA CAMPANA, L. D. Elecampane. See BOTANY, p. 253.

716 Golden rod.

214. SOLIDAGO VIRGA AUREA. VIRGA AUREA, D. Golden rod. See BOTANY, p. 253.

215. TUSSILAGO FARFARA, E. TUSSILAGO, L. D. Coltsfoot. See BOTANY, p. 252.

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216. ANTHEMIS NOBILIS, E. CHAMÆMELUM, L. D. Chamomile flowers. See BOTANY, p. 254.

717 Colts foot.

718 Chamomile flowers.

An excellent tonic and anthelmintic. Dose in substance about a scruple in powder, or one dram in infusion. Used externally as an emollient and discutient, in the form of clyster or fomentation.

Officinal Preparations.

719 Decoction of chamomile.

a. DECOCTUM ANTHEMIDIS NOBILIS, E. DECOCTUM CHAMÆMELI, D. Decoction of chamomile.

Prepared by boiling an ounce of chamomile flowers, and half an ounce of bruised carraway seeds, in five pounds of water (E.), or half an ounce of chamomile flowers with two drams of sweet fennel seeds, in a pound of water (D).

Used as a carminative clyster, or stimulant fomentation.

720 Extract of chamomile.

b. EXTRACTUM ANTHEMIDIS NOBILIS, E. EXTRACTUM CHAMÆMELI, L. Extract of chamomile.

Prepared as other watery extracts. Dose from a scruple to a dram, as a tonic and anthelmintic.

721 Pellitory of Spain.

217. ANTHEMIS PYRETHRUM, E. PYRETHRUM, L. D. Pellitory of Spain.

Used chiefly as a masticatory in toothach.

Order 3. POLYGAMIA FRUSTRANEA.

722 Blessed thistle.

218. CENTAUREA BENEDICTA, E. CARDUUS BENEDICTUS, L. D. Blessed thistle. See BOTANY, p. 255.

CLASS XX. GYNANDRIA. Order 5. HEXANDRIA.

723 Virginian snake root.

219. ARISTOLOCHIA SERPENTARIA, E. SERPENTARIA VIRGINIANA, L. D. Virginian snakeroot. See Duncan's Dispensatory, and the Synopsis Materiæ Medicæ.

Employed as a stimulant and tonic in low fevers, gangrene, &c. Dose in substance 10 grains to 30.

Officinal Preparation.

724 Tincture of snake root.

a. TINCTURA ARISTOLOCHIÆ SERPENTARIÆ, E. TINCTURA SERPENTARIÆ, L. D. Tincture of snakeroot.

Prepared by digesting two ounces of bruised Virginian snakeroot, and a dram of powdered cochineal, in two pounds and a half of diluted alcohol, for seven days (E.), or three ounces of snakeroot in two pints (L.) or two pounds (D.) of proof spirit, for seven or eight days. Dose from two drams to half an ounce.

Order 10. POLYANDRIA.

725 Wake robin.

220. ARUM MACULATUM. ARUM, L. D. Arum, or wake robin.

Officinal

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Officinal Preparations.

a. Conserva Ari, L. Conserve of arum.

726 Conserve of arum. Made by beating a pound and a half of the fresh root of arum bruised, with a pound and a half of double refined sugar, into a conserve. Dose about a dram.

Class XXI. MONOECIA. Order 1. Monogynia.

727 Nutmeg tree. 221. Myristica moschata, E. MYRISTICA, L. D. Nutmeg tree.

728 Oil of mace. Nux Moschata. Nutmeg. Macis. Mace. Oleum Macis. Oil of Mace. See Duncan's Dispensatory.

Officinal Preparations.

729 Spirit of nutmeg. *a.* Spiritus Myristicæ Moschatæ, E. SPIRITUS NUCIS MOSCHATÆ, L. D. Spirit of nutmeg.

A gallon of spirit distilled from two ounces of well-bruised nutmegs. A good cordial. Dose about half an ounce.

Order 4. Tetrandria.

730 Birch juice. 222. Betula alba, D. Birch juice.

A gentle diuretic.

731 Mulberries. 223. Morus nigra. Morus, L. Mulberries.

Officinal Preparation.

732 Syrup of mulberry juice. *a.* Syrupus Succi fructus Mori, L. Syrup of mulberry juice.

Prepared in the same manner as the syrup of black currant juice.

Employed as a refrigerant and demulcent.

733 Common stinging nettle. 224. Urtica dioica. URTICA, L. Common stinging nettles.

Used as a rubefacient to paralytic limbs, which are whipped with nettles.

Order 8. Polyandria.

734 Oak bark. 225. Quercus robur, E. QUERCUS, L. D. Oak bark.

A powerful astringent, employed in passive hemorrhages, diarrhœa, leucorrhœa, and similar cases. Dose in substance 15 grains to half a dram of the powdered bark. Used externally by way of gargle, or lotion.

Officinal Preparation.

735 Extract of oak bark. *a.* Extractum Quercus, D. Extract of oak bark.

Prepared like other watery extracts. Dose 10 grains to a scruple.

736 Gall-nuts. 226. Quercus Cerris, E. L. D. GALLA. Gall-nuts. See Duncan's Dispensatory.

This is perhaps a more powerful astringent than oak bark, and is employed in similar cases.

227. Juglans regia. JUGLANS, L. Unripe walnuts. History of Simple and Officinal Medicines.

Employed as a tonic and anthelmintic.

Order 10. Monadelphia.

737 Walnut. 228. Pinus abies. The fir tree.

738 Fir tree. Pix Burgundica, E. D. Burgundy pitch.

739 Burgundy pitch.

Officinal Preparation.

740 Compound Burgundy pitch plaster. *a.* Emplastrum Picis Burgundicæ, D. EMPLASTRUM PICIS COMPOSITUM, L. Compound Burgundy pitch plaster.

Prepared of two pounds of Burgundy pitch, one pound of ladanum (L.) or of galbanum (D.), four ounces of yellow wax, the same of yellow resin, and one ounce of expressed oil of mace.

A stimulating plaster.

229. Thus, L. Frankincense.

741 Frankincense.

Officinal Preparation.

742 Compound plaster of frankincense. *a.* Emplastrum Thuris compositum, L. Compound plaster of frankincense.

Prepared of half a pound of frankincense, three ounces of dragon's blood, and two pounds of litharge plaster, adding the resins in powder to the melted litharge plaster.

230. Pinus balsamea. Hemlock fir.

743 Balsam of Canada Balsamum Canadense, E. L. D. Balsam of Canada.

744 Larch. 231. Pinus Larix. The larch.

745 Venice turpentine. Terebinthina Veneta, E. D. Venice turpentine. 746 Oil of turpentine. OLEUM VOLATILE PINI, E. OLEUM TEREBINTHINÆ, L. D. Oil of turpentine.

The oil of turpentine is directed by the London college to be prepared by distillation from common turpentine.

Officinal Preparation.

747 Purified oil of turpentine. Oleum volatile Pini purissimum, E. OLEUM TEREBINTHINÆ RECTIFICATUM, L. D. Purified oil of turpentine. *Spirit of turpentine.*

Distilled with the addition of water in well luted vessels till the purest part of the oil has come over.

Stimulant and diuretic. Dose from 10 to 30 drops. Mixed with an equal proportion of ether, it is much recommended in calculus. It is an excellent application to chilblains and recent burns.

232. Pinus Sylvestris.

A. Pix Liquida, E. D. Tar. 748 Tar.

Officinal Preparation.

746 Tar ointment. *a.* Unguentum Picis, E. L. D. Tar ointment.

Prepared by melting together equal parts of tar and mutton

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mutton suet (L. D.), or five parts of tar and two parts of yellow wax (E.).

Esteemed a good application in cutaneous diseases, especially *tinea capitis*.

750 Common turpentine.

B. TEREBINTHINA VULGARIS, L. D. Common turpentine.

This, like other turpentines, is a stimulant and diuretic.

751 Yellow rosin.

C. RESINA FLAVA, L. RESINA ALBA, D. Yellow rosin. *White rosin.*

Employed chiefly in making stimulating ointments and plasters.

Officinal Preparations.

752 Resinous ointment.

a. UNGUENTUM RESINOSUM, E. UNGUENTUM RESINÆ FLAVÆ, L. D. Resinous ointment. *Yellow basilicon.*

Prepared by melting together eight parts of hog's lard, five of white rosin, and two of yellow wax (E.); or by melting together, of yellow rosin and yellow wax, each one pound, over a slow fire, adding a pint or seven ounces of olive oil, and straining the mixture while hot (L. D.).

753 Cerate of yellow rosin.

b. CERATUM RESINÆ FLAVÆ, L. D. Cerate of yellow rosin.

Prepared by melting together half a pound of the preceding ointment, and one ounce of yellow wax.

These are intended as stimulating applications to ulcers that do not heal or suppurate properly.

754 Resinous plaster.

c. EMPLASTRUM RESINOSUM, E. EMPLASTRUM LYTHARGYRI CUM RESINA, L. EMPLASTRUM ADHESIVUM. Resinous plaster. *Litharge plaster with rosin. Adhesive plaster.*

Prepared by melting five parts (E.), or three pounds (L.), of plaster of semivitrified oxide of lead (*litharge plaster*), and adding one part (E) or half a pound (L.) of white or yellow rosin powdered.

Employed, spread on linen, to form adhesive plasters, for keeping the edges of ulcers or recent wounds together; for giving mechanical support to ulcerated limbs, or keeping on other dressings.

755 Palma christi seeds.

233. RICINUS COMMUNIS, E. L. D. Palma christi seeds. See BOTANY, p. 271.

Officinal Preparation.

756 Castor oil.

a. OLEUM RICINI, L. Castor oil.

Expressed in the usual manner from the husked seeds.

Castor oil is seldom prepared in this country, being brought chiefly from the West Indies. When cold drawn, it is milder, and less subject to become rancid, but it requires a larger dose than the common oil. It is an excellent purgative, well suited to cases of colic and worms, given either by the mouth, or by way of clyster. Dose in the former case about one ounce, and in the latter about two ounces.

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234. CROTON ELEUTHERIA, E. CASCARILLA, L. D. Cascarilla bark.

An excellent aromatic tonic. Dose about half a dram, or two scruples, two or three times a-day.

757 Cascarilla bark.

Officinal Preparations.

758 Tincture of cascarilla.

a. TINCTURA CASCARILLÆ, L. D. Tincture of cascarilla.

Prepared by digesting four ounces of powdered cascarilla bark in two pints or two pounds (D.) of proof spirit for about a week, with a gentle heat. Dose about one ounce; best in composition with decoction or infusion of cinchona.

759 Extract of cascarilla.

b. EXTRACTUM CASCARILLÆ, L. D. Extract of cascarilla.

Prepared in the usual way of making extracts. Dose from 10 to 30 grains.

Order 10. SYNGENESIA.

760 Wild cucumber.

235. MOMORDICA ELATERIUM, E. CUCUMIS AGRESTIS, L. D. Wild cucumber.

Officinal Preparation.

761 Elaterium.

a. SUCCUS SPISSATUS MOMORDICÆ ELATERII, E. ELATERIUM, L. Inspissated juice of wild cucumber. *Elaterium.*

This is prepared by slicing ripe wild cucumbers, expressing the juice very gently, and straining it through a very fine hair sieve; boiling it a little, and setting it by for some hours, till the thicker part has subsided. The supernatant fluid is then poured off, and separated by filtering from the thicker matter, which is to be dried and kept for use.

A violent cathartic, employed in dropsy. Dose half a grain to one grain.

762 Colocynth.

236. CUCUMIS COLOCYNTHIS, E. COLOCYNTHIS, L. D. Colocynth or bitter apple. See BOTANY, p. 271.

Officinal Preparation.

763 Compound extract of colocynth.

a. EXTRACTUM COLOCYNTHIDIS COMPOSITUM, L. Compound extract of colocynth.

Prepared by digesting six drams of the pith of colocynth, cut small, in a pint of proof spirit, with a gentle heat for four days, then dissolving in the expressed tincture one ounce and a half of powdered socotorine aloes, and half an ounce of powdered scammony; and lastly drawing off the spirit, and adding to the inspissated extract, a dram of husked cardamom seeds in powder.

A strong cathartic and anthelmintic. Dose from 5 to 30 grains.

764 Bryony root.

237. BRYONIA ALBA. BRYONIA, D. Bryony root. See BOTANY, p. 271. where it is described under the name of *Bryonia dioica*.

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CLASS XXII. DIŒCIA. Order 2. DIANDRIA.

228. SALIX FRAGILIS. SALIX, D. Crack willow bark.

765 Crack willow bark.

A good tonic, employed as a substitute for Peruvian bark. Dose about one dram.

Order 5. PENTANDRIA.

766 Chio turpentine.

239. PISTACIA TEREBINTHUS. TEREBINTHINA CHIA, L. Chio turpentine.

Not materially different from the other turpentines.

767 Mastich.

240. PISTACIA LENTISCUS, E. MASTICHE, L. Mastich. See BOTANY, p. 276, and CHEMISTRY, N° 2464.

768 Hop.

241. HUMULUS LUPULUS. Hop.

A good narcotic, which has been found an excellent substitute for opium. See an *Inaugural dissertation de Humulo Lupulo*, lately printed at Edinburgh by Dr de Roches; and Kirby's Tables, p. 94.

Order 6. HEXANDRIA.

769 Sarsaparilla root.

242. SMILAX SARSAPARILLA, E. SARSAPARILLA, L. D. Sarsaparilla root.

A slight diaphoretic, of little efficacy.

Officinal Preparations.

770 Decoction of sarsaparilla.

a. DECOCTUM SMILACIS SARSAPARILLÆ, E. DECOCTUM SARSAPARILLÆ, L. D. Decoction of sarsaparilla.

Prepared by digesting six ounces of sliced sarsaparilla root in eight pints of distilled water, for two hours in a heat of about 195°; then taking out the root and bruising it, repeating the maceration; then boiling the liquor down to four pints, pressing it out, and straining the decoction.

771 Compound decoction of sarsaparilla.

b. DECOCTUM SARSAPARILLÆ COMPOSITUM, L. D. Compound decoction of sarsaparilla.

Made by macerating six ounces of sliced and bruised sarsaparilla root, one ounce of the bark of sassafras root, in ten pints of distilled water, for six hours; then boiling down to five pints, adding towards the end three drams of mezereon, and straining the decoction.

A good diet drink, but scarcely superior to the compound decoction of guaiacum. Dose from four to eight ounces, three or four times a-day.

Order 12. MONADELPHIA.

772 Juniper berries.

243. JUNIPERUS COMMUNIS, E. JUNIPERUS, L. D. Juniper berries. See BOTANY, p. 278.

Officinal Preparations.

773 Oil of juniper.

a. OLEUM VOLATILE JUNIPERI COMMUNIS, E. OLEUM JUNIPERI BACCÆ, L. OLEUM BACCARUM JUNIPERI, D. Oil of juniper berries.

Distilled in the same manner as other volatile oils. Stimulant and diuretic. Dose from three to ten grains.

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b. SPIRITUS JUNIPERI COMMUNIS COMPOSITUS, E. SPIRITUS JUNIPERI COMPOSITUS, L. D. Compound spirit of juniper.

774 Compound spirit of juniper.

Nine pounds or a gallon of diluted alcohol distilled from one pound of well bruised juniper berries, one ounce and a half of bruised carraway seeds, and the same of sweet fennel seeds.

A good diuretic, but not superior to common gin.

775 Olibanum.

244. JUNIPERUS LYCIA, E. OLIBANUM, L. D. Olibanum. See CHEMISTRY, N° 2487.

776 Savine.

245. JUNIPERUS SABINA, E. SABINA, L. D. Savine.

Reputed a specific in uterine obstructions, but gradually losing its celebrity. Dose in substance from fifteen grains to two scruples. Applied externally as an escharotic to venereal warts and similar excrescences.

Officinal Preparations.

777 Volatile oil of savine.

a. OLEUM VOLATILE JUNIPERI SABINÆ, E. OLEUM SABINÆ, D. Volatile oil of savine.

778 Extract of savine.

b. EXTRACTUM SABINÆ, L. D. Extract of savine.

Made like other extracts. Dose from 10 to 30 grains twice or thrice a day.

779 Compound tincture of savine.

c. TINCTURA SABINÆ COMPOSITA, L. Compound tincture of savine.

Prepared by digesting one ounce of extract of savine in a pint of tincture of castor, and half a pint of tincture of myrrh, till the extract is dissolved.

Given as an emmenagogue, and as an antispasmodic in hypochondriac affections. Dose from 30 drops to a dram twice or thrice a day.

780 Pareira root.

246. CISSAMPELOS PAREIRA. PAREIRA BRAVA, L. Pareira brava root. See Duncan's Dispensatory.

CLASS XXIII. POLYGAMIA. Order 1. MONOECIA.

781 Gamboge.

247. STALAGMITIS CAMBOGIOIDES. GAMBOGIA, E. L. D. Gamboge. See Duncan's Dispensatory.

A violent cathartic and anthelmintic. Dose from 1 or 2 grains or 10 or 15 grains. The latter chiefly in cases of tenia.

782 White hellebore root.

248. VERATRUM ALBUM, E. HELLEBORUS ALBUS, L. D. White helleborc root. See BOTANY, p. 281.

Officinal Preparations.

783 Decoction of white hellebore.

b. DECOCTUM HELLEBORI ALBI, L. Decoction of white hellebore.

Made by boiling an ounce of powdered white helle-

bore

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bore root in two pints of distilled water to one pint, and adding to the strained liquor when cold two ounces of rectified spirit of wine.

Used as a lotion, diluted, if necessary, in the itch, and similar cutaneous affections.

784 Tincture of white hellebore.

b. TINCTURA VERATRI ALBI, E. Tincture of white hellebore.

Prepared by digesting eight ounces of powdered white hellebore root in two pounds and a half of diluted alcohol for several days, and filtering through paper.

Employed occasionally to assist the operation of emetics and cathartics, in some apoplectic and paralytic cases, in mania; dose in these cases from half a dram to two drams. Employed also as a general stimulant or alterative in cutaneous diseases, beginning with about two drops twice or thrice a day, and gradually increasing the dose.

785 Ointment of white hellebore.

c. UNGUENTUM HELLEBORI ALBI, L. D. Ointment of white hellebore.

Prepared by mixing four ounces of ointment of hogs lard, with one ounce of powdered white hellebore, and one scruple of essential oil of lemon.

Used in similar cases with the decoction.

786 Catechu.

249. MIMOSA CATECHU, E. CATECHU, L. D. Catechu, or *Japan earth*. See BOTANY, p. 282.

A powerful astringent, employed in diarrhœas, uterine hemorrhage; and externally by way of lotion, or lozenge, for exulcerations and aphthous ulcers of the mouth. Dose internally from 15 grains to two scruples.

Officinal Preparations.

787 Infusion of catechu.

a. INFUSUM MIMOSÆ CATECHU, E. INFUSUM JAPONICUM. Infusion of catechu.

Prepared by macerating two drams and a half of powdered extract of catechu, and half a dram of bruised cinnamon, in seven ounces of boiling water, for two hours, in a covered vessel, straining the liquor, and adding one ounce of simple syrup. Dose from one to two ounces.

788 Tincture of catechu.

b. TINCTURA MIMOSÆ CATECHU, E. TINCTURA CATECHU, L. TINCTURA JAPONICA. Tincture of catechu.

Prepared by digesting three ounces of extract of catechu, and two ounces of bruised cinnamon, in two pounds and a half, or two pints (L.), of diluted alcohol, for seven or ten days, and straining through paper. Dose two or three drams.

c. ELECTUARIUM MIMOSÆ CATECHU, E. ELECTUARIUM CATECHU COMPOSITUM, D. CONFECTIO JAPONICA. Electuary of catechu. *Japonica Confection.* See preparations of opium.

789 Gum arabic.

250. MIMOSA NILOTICA, E. GUMMI ARABICUM, L. D. Gum arabic.

A dry mucilage, very useful as an emollient and demulcent.

Officinal Preparations.

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a. MUCILAGO MIMOSÆ NILOTICÆ, E. MUCILAGO ARABICI GUMMI, L. D. Mucilage of gum arabic.

790 Mucilage of gum arabic.

Prepared by dissolving one part of powdered gum-arabic in about two of boiling water, and straining.

791 Arabic emulsion.

b. EMULSIO MIMOSÆ NILOTICÆ, E. EMULSIO ARABICA, D. Arabic emulsion.

Prepared, according to the Edinburgh process, in the same manner as almond emulsion, with the addition of two ounces of gum arabic, added while beating the almonds. The Dublin emulsion is composed of two drams of powdered gum arabic, half an ounce of large almonds, three drams of double refined sugar, and one pound of decoction of barley.

Employed in the same cases as almond emulsion.

792 Gum troches.

c. TROCHISCI GUMMOSI, E. Gum troches.

Prepared of four parts of gum arabic, one of powdered starch, and 12 of double refined sugar, made into a mass for troches with water.

Similar in uses to the lozenges of starch. See N° 369.

793 Pellitory of the wall.

251. PARIETARIA OFFICINALIS. PARIETARIA, L. Pellitory of the wall.

Order 2. DIOECIA.

794 Manna.

252. FRAXINUS ORNUS, E. L. D. Manna-ash. *Manna.*

A mild purgative, well suited to children, but requiring some gentle aromatic to prevent griping. Dose from a dram to half an ounce. Best in composition with senna.

Officinal Preparation.

795 Syrup of manna.

a. SYRUPUS MANNÆ, D. Syrup of manna.

Prepared by macerating half an ounce of senna in one pound of boiling water for twelve hours in a covered vessel, straining the liquor, and adding one pound of manna, and one pound of double refined sugar, to make a syrup.

This forms an excellent purgative for children.

796 Ginseng root.

253. PANAX QUINQUEFOLIUM. GINSENG, L. Ginseng root.

A Chinese root, formerly much in repute as a stimulant, but now out of fashion.

Order 3. TRIOECIA.

797 Figs.

254. FICUS CARICA, E. CARICA, L. D. Figs. See BOTANY, p. 282.

A gentle laxative, used chiefly in composition.

CLASS XXIV. CRYPTOGAMIA. Order 1. FILICES.

798 Male fern root.

255. POLYPODIUM FILIX MAS, E. FILIX, L. FILIX

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FILIX MAS, D. Male fern root. See BOTANY, p. 285.

This substance has been in great repute as an anthelmintic, especially in cases of tænia, given in doses of a dram or two, followed by a strong cathartic.

Order 3. ALGÆ.

799 Iceland liver-wort.

256. LICHEN ISLANDICUS. Iceland liver-wort.

This lichen has lately become a fashionable remedy as an emollient, in pulmonary consumption. It contains a great quantity of farinaceous and mucilaginous matter, and is therefore highly nutritious.

See Synopsis Materiæ Medicæ, and Thesaurus Medicaminum.

Order 4. FUNGI.

800 Female agaric.

257. BOLETUS IGNIARIUS, E. AGARICUS. Female agaric.

This substance has been much celebrated as a styptic; and before ligatures were so much employed, was used to stop hæmorrhage from the mouths of bleeding vessels during surgical operations. It is now out of fashion.

Appendix. PALMÆ.

801 Palm oil.

258. COCOS BUTYRACEA. PALMA, E. Mackaw tree. *Palm oil.* See BOTANY, p. 289.

A vegetable oily matter, employed as an external emollient.

CHAP. III. *MINERAL SUBSTANCES.*

SECT. I. *Water.*

802 Water.

259. AQUA. Water.

Though simple water forms no part of the Materia Medica in the Pharmacopœias, it is an article of so much importance, both in diet and medicine, that it ought not to be omitted here. We shall therefore make no apology for inserting the following neat account of it, given by Dr Duncan in the later editions of his Dispensatory.

803 Show or rain water purest.

"The chemical properties of water have been already enumerated. (See CHEMISTRY, N° 384, *et seq.*) The purest natural water is snow or rain water collected in the open fields; that which falls in towns, or is collected from the roofs of the houses, is contaminated with soot, animal effluvia, and other impurities; although, after it has rained for some time, the quantity of these diminishes so much, that Morveau says that it may be rendered almost perfectly pure by means of a little barytic water, and exposure to the atmosphere. Rain water, after it falls, either remains on the surface of the earth, or penetrates through it, until it meets with some impenetrable obstruction to its progress, when it bursts out at some lower part, forming a spring or well. The water on the surface of the earth, either descends along its declivities in streams, which gradually wearing channels for themselves, combine to form rivers, which at last reach the sea; or remains stagnant in cavities of considerable depth, forming lakes or ponds, or on nearly level ground, forming marshes.

"The varieties of spring water are exceedingly numerous; but they may be divided into soft, which are sufficiently pure to dissolve soap, and to answer the purposes of pure water in general; the hard, which contain earthy salts, and decompose soap, and are unfit for many purposes, both in domestic economy, and in manufactories; and the saline, which are strongly impregnated with soluble salts. When spring waters possess any peculiar character, they are called *mineral waters.* River water is in general soft, as it is formed of spring water, which, by exposure becomes more pure; and running surface water, which, although turbid from particles of clay suspended in it, is otherwise very pure. Lake water is similar to river water. The water of marshes, on the contrary, is exceedingly impure, and often highly fetid, from the great proportion of animal and vegetable matters which is constantly decaying in them.

804 Varieties of water.

805 Mineral waters.

"Mineral waters derive their peculiarity of character, in general, either from containing carbonic acid or soda not neutralized, sulphurated hydrogen, purging salts, earthy salts, or iron; or from their temperature exceeding in a greater or less degree that of other surrounding bodies. The following are the most celebrated.

806 Warm springs.

"*a. Warm Springs.*—Bath, Bristol, Buxton, Matlock, in England. Barege, Vichy, &c. in France. Aix-la-Chapelle, Borset, Baden, Carlsbad and Toeplitz in Germany; and Pisa, Lucca, Baia, and many others in Italy.

807 Carbonated springs.

"*b. Carbonated Springs.*—Pyrmont, Seltzer, Spa, Cheltenham, Scarborough.

808 Alkaline.

"*c. Alkaline.*—Carlsbad, Aix-la-Chapelle, Barege, Toeplitz.

809 Sulphureous.

"*d. Sulphureous.*—Enghien, Lu, Aix-la-Chapelle, Kelburn, Harrowgate, Moffat, and many in Italy.

810 Purging waters.

"*e. Purging.*—Sea water, Lemington Priors, Harrowgate, Lu, Carlsbad, Moffat, Toeplitz, Epsom, Sedlitz, Kelburn, and all brackish waters.

811 Calcareous.

"*f. Calcareous.*—Matlock, Buxton, and all hard waters.

812 Chalybeate.

"*g. Chalybeate.*—Hartfell, Denmark, Cheltenham, Pyrmont, Spa, Tunbridge, Bath, Scarborough, Vichy, Carlsbad, Lemington Priors.

813 Medical use of water.

"*Medical use.*—Water is an essential constituent in the organization of all living bodies; and as it is continually expended during the process of life, that waste must be also continually supplied; and this supply is of such importance, that it is not left to reason or to chance, but forms the object of an imperious appetite. When taken into the stomach, water acts by its temperature, its bulk, and the quantity absorbed by the lacteals. Water about 60 degrees, gives no sensation of heat or cold; between 60 degrees and 45, it gives a sensation of cold followed by a glow and increase of appetite and vigour; below 45, the sensation of cold is permanent and unpleasant, and it acts as an astringent and sedative; above 60, it excites nausea and vomiting, probably by partially relaxing the fibres of the stomach, for when mixed with stimulating substances it has not these effects. In the stomach and in the intestines it acts also by its bulk, producing the effects arising from the distension of these organs; and as the intestinal gases consist of hydrogen gas, either pure, or carbonated, or sulphurated, or phosphorated, it is probably in part decomposed in them. It likewise dilutes the contents of the stomach and intestines, thus often di-

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minishing their acrimony. It is absorbed by the lacteals, dilutes the chyle and the blood, increases their fluidity, lessens their acrimony, and produces *plethora ad molem*. Its effects in producing plethora and fluidity are, however, very transitory, as it at the same time increases the secretion by the skin and kidneys. Indeed the effects of sudorifics and diuretics depend in a great measure on the quantity of water taken along with them.

"Mineral waters have also a specific action, depending on the foreign substances which they contain. It is, however, necessary to remark, that their effects are in general much greater than might be expected from the strength of their impregnations, owing probably to the very circumstance of their great dilution, by which every particle is presented in a state of activity, while the lacteals admit them more readily than they would in a less diluted state.

"Carbonic acid gas gives to the waters which are strongly impregnated with it, a sparkling appearance, and an agreeable degree of pungency. In its effects on the body it is decidedly stimulant, and even capable of producing a certain degree of intoxication. It is of great service in bilious complaints, atony of the stomach, nausea, and vomiting, and in all fevers of the typhoid type.

"Alkaline waters produce also a tonic effect on the stomach, but they are less grateful. They are particularly serviceable in morbid acidity of the stomach, and in diseases of the urinary organs.

"Sulphureous waters are chiefly used in cutaneous and glandular diseases. Their effects are stimulant and heating, and they operate by the skin or bowels.

"Purging waters derive their effects from the neutral salts they contain, especially the muriates of soda, lime, and magnesia, and the sulphates of soda and magnesia. They are much more frequently used for a length of time to keep the bowels open by exciting the natural action, than to produce full purging. Used in this way, instead of debilitating the patient, they increase his appetite, health, and strength.

"Chalybeate waters are used as tonics. They stimulate considerably, and increase the circulation; but as they also generally contain neutral salts, they act as gentle laxatives. They are used in all cases of debility, cachexia, chlorosis, fluor albus, amenorrhœa; and, in general, in what are called nervous diseases.

814 External use of water.

"The external use of water depends almost entirely on its temperature, which may be

"1. Greater than that of the body, or above 97° Fahr. The hot bath.

"2. Below the temperature of the body.

a. From 97 to 85, the warm bath.

b. From 85 to 65, the tepid bath.

c. From 65 to 32, the cold bath.

815 Hot bath.

"The hot bath is decidedly stimulant in its action. It renders the pulse frequent, the veins turgid, the face flushed, the respiration quick; increases animal heat, and produces sweat. If the temperature be very high, the face becomes bathed in sweat, the arteries at the neck and temples beat with violence, anxiety and a sense of suffocation are induced; and if persisted in, vertigo, throbbing in the heart, and apoplexy, are the consequences. It is very rarely employed in medicine, except where there are hot springs, as at Baden in Switzerland.

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"The Russians and some other nations use the hot bath as an article of luxury.

"The effects of the affusion of hot water have not been ascertained; and it is probable, that when the heat is not so great as to destroy the organization of the skin, the very transient application of the water would be more than counteracted by the subsequent evaporation.

"With regard to the action arising from their temperature, all baths below 97° differ only in degree, as they all ultimately abstract caloric from the surface, but with a force inversely as their temperature.

816 Warm bath.

"The warm bath excites the sensation of warmth, partly because our sensations are merely relative, and partly because its temperature, though less than that of the internal parts of the body, is actually greater than that of the extremities, which are the chief organs of touch. But as water is a much better conductor of caloric than air, and especially than confined air, as much caloric is abstracted from the body by water, which is a few degrees lower than the external temperature of the body, as by air of a much lower temperature. The warm bath diminishes the frequency of the pulse, especially when it has been previously greater than natural; and this effect is always in proportion to the time of immersion. It also renders the respiration slower, and lessens the temperature of the body, relaxes the muscular fibre, increases the bulk of the fluids by absorption, removes impurities from the surface, promotes the desquamation and renewal of the cuticle, and softens the nails and indurations of the skin.

"The stimulant power of the warm bath is therefore very inconsiderable, and its employment in disease will be chiefly indicated by preternatural heat of the surface, and frequency of the pulse, rigidity of the muscular fibre, and morbid affections of the skin. It has accordingly been found serviceable in many cases of pyrexia, both febrile and exanthematous, in many spasmodic diseases, and in most of the impetigines. It is contraindicated by difficulty of breathing and internal organic affections, and should not be used when the stomach is full.

817 Affusion of warm water.

"The affusion of warm water very generally produces a considerable diminution of heat, a diminished frequency of pulse and respiration, and a tendency to repose and sleep; but its effects are not very permanent, and its stimulus is weak. It is recommended in febrile diseases, depending on the stimulus of preternatural heat, and in those attended with laborious respiration, and in the paroxysms of hectic fever.

"As the tepid bath and affusion produce effects intermediate between those and cold water, it is unnecessary to enumerate them.

818 Cold bath.

"The cold bath produces the sensation of cold, which gradually ceases, and is succeeded by numbness. It excites tremor in the skin, and shivering. The skin becomes pale, contracted, and acquires the appearance termed *cutis anserina*. The fluids are diminished in volume, the solids are contracted, the caliber of the vessels is lessened, and therefore numbness and paleness are induced, and the visible cutaneous veins become smaller. There is a sense of drowsiness and inactivity, the joints become rigid and inflexible, and the limbs

are

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are affected with pains and spasmodic contractions. The respiration is rendered quick and irregular, the pulse slow, firm, regular, and small; the internal heat is at first diminished, but gradually and irregularly returns nearly to its natural standard; the extremities, however, continue cold and numb, or swollen and livid; the perspiration is suppressed, and the discharge of urine is rendered more frequent and copious. If the cold be excessive on its application, long-continued violent shiverings are induced, the pulse ceases at the wrist, the motion of the heart becomes feeble and languid, there is a sensation of coldness and faintness at the stomach, and a rapid diminution of animal heat; and, at last, delirium, torpor, and death, are the consequences. If the application of the cold bath be not carried to an excessive length, on emerging from the water the whole body is pervaded by an agreeable sensation of warmth, and the patient feels refreshed and invigorated.

"The primary action of the cold bath is stimulant, and the degree of this action is in proportion to the lowness of its temperature. This opinion is indeed directly opposite to a theory of cold which has been advanced with the confidence of demonstration. "Heat is a stimulus, cold is the abstraction of heat; therefore cold is the abstraction of stimulus, or is a sedative." To this we might oppose another theory, equally syllogistic, and nearer the truth. Free caloric is a stimulus, cold is the sensation excited by the passage of free caloric out of the body; therefore cold is a stimulus. But, in fact, the action of cold is by no means so simple. It is complicated, and varies according to its intensity, duration, and the state of the system to which it is applied. It acts at first as a stimulant, in exciting sensation; then as a tonic, in condensing the living fibre; and, lastly, however paradoxical it may appear, as a sedative, by preventing that distribution of blood in the minute and ultimate vessels, which is necessary for the existence of sensibility and irritability, and by the abstraction of the stimulus of heat.

"The cold bath may be so managed as to procure any of these effects, by regulating the length of time for which it is applied.

819 Cold affusion.

"Cold affusion, or the pouring of cold water over the body, is a very convenient way of applying the cold bath in many cases. In this way cold is very suddenly applied to the surface, its operation is instantaneous and momentary; but may be continued by repeated affusions for any length of time, and so as to produce its extreme effects. Where the effects of cold affusion may be thought too severe, sprinkling the body with cold water, or water and vinegar, may be substituted.

"The application of cold may be employed in fevers and febrile paroxysms, when the heat is steadily above the natural standard, and in many diseases arising from relaxation and debility. It is contraindicated when the heat of the body is below 97°, when there is any notable perspiration from the surface; and when there is general plethora. Debilitated habits should be defended from the violence of its action, by covering the body with flannel.

"In yellow fever, especially in those cases in which the heat of the skin is excessive, it is particularly useful, and ought to be long continued. In phrenitis and other local inflammations, it promises to be of advantage. In gouts its effects are doubtful, being in some instances salutary, in others destructive. A criterion to enable us to determine when it ought or ought not to be resorted to, is much wanted. In inflammatory rheumatism and rheumatic gout it is decidedly useful. It is of advantage in all the hemorrhagies and exanthemata; in tetanus, cholic, cholera, hysteria, mania, ischuria, and in burns; and, in general, in all those local diseases in which solutions of acetate of lead, of muriate of ammonia, &c. are usually employed; for the good effects of these depend entirely on the diminished temperature *."

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* *Duncan's Dispensatory*, 3d edit. p. 165.

For more respecting the utility of the cold affusion, see Currie's "Medical Reports; and for an excellent account of the effects and uses of baths, see Marcard *de la Nature et de l'Usage des Bains*, and a Treatise on Cold and Warm Bathing, lately published at Edinburgh.

Officinal Preparation.

820 Distilled water.

a. AQUA DESTILLATA, E. AQUA DISTILLATA, L. D. Distilled water.

From 10 gallons of spring water, the London college directs four gallons to be drawn off, throwing away the first four pints that come over. The Dublin college directs 10 pounds to be distilled from 20 pounds, throwing away the first pound; while the college of Edinburgh directs water to be distilled in very clean vessels till two-thirds have come over.

SECT. II. *Inflammable Substances.*

821 Sublimed sulphur.

260. SULPHUR SUBLIMATUM, E. L. D. FLORES SULPHURIS. Sublimed sulphur. *Flowers of Sulphur.*

For an account of the chemical nature and properties of sulphur, see CHEMISTRY, Chap. ix.

As a medicine, sulphur is employed both internally and externally. Internally it is given as a laxative, in the dose of a dram or two, and as a diaphoretic in smaller doses. Externally it is one of the most certain remedies for the itch, and some other cutaneous affections.

Officinal Preparations.

822 Washed sublimed sulphur.

a. SULPHUR SUBLIMATUM LOTUM, E. D. FLORES SULPHURIS LOTI, L. Washed sublimed sulphur. *Washed flowers of sulphur.*

Sublimed sulphur is freed from the sulphureous acid, which it has imbibed in the preparation, by boiling it for a little in four times its weight of water, and after pouring off the water in which it was boiled, washing it by repeated affusions of cold water, till it no longer imparts acidity to the water.

Sublimed sulphur should always be washed before being used internally, otherwise it is very apt to disorder the stomach and bowels.

823 Sulphurated oil.

b. OLEUM SULPHURATUM, E. L. Sulphurated oil.

Prepared by boiling one part of sublimed sulphur in eight of olive oil (E.), or one part to four parts (L.), in a large iron pot, till they are thoroughly united. Formerly much

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much used as an expectorant in coughs, in a dose of from 10 to 40 drops, but now seldom used, except as an external application to foul ulcers.

824 Sulphurated petroleum.

c. PETROLEUM SULPHURATUM, L. Sulphurated petroleum.

Prepared in the same manner as the last, with oil of petroleum, and used for the same purpose.

825 Ointment of sulphur.

d. UNGUENTUM SULPHURIS, E. L. D. Ointment of sulphur.

Prepared by mixing half a pound (L.) or five ounces (D.) of ointment of hog's-lard, with four ounces (L.) or three ounces (D.) of flowers of sulphur; or four parts of hog's-lard, with one of sublimed sulphur, adding to each pound of the ointment, half a dram of volatile oil of lemons, or volatile oil of lavender (E.).

An excellent application in the itch. Ordinary quantity for an adult about four ounces, which should be rubbed in at once.

826 Sulphuret of potash.

c. SULPHURETUM POTASSÆ, E. KALI SULPHURATUM, L. ALKALI VEGETABILE SULPHURATUM, D. HEPAR SULPHURIS. Sulphuret of potash. *Sulphurated kali. Sulphurated vegetable alkali. Liver of sulphur.*

For the preparation and chemical properties of this substance, see CHEMISTRY, N° 918.

Sulphuret of potash is seldom employed in medicine, except as a remedy in violent mercurial salivation, in which it is said to be very effectual *. It has lately been much recommended, dissolved in lime water, as an effectual external application in *tinea capitis*.

* See *Kirby's Tables*, p. 43.

827 Precipitated sulphur.

f. SULPHUR PRÆCIPITATUM, L. D. Precipitated sulphur.

Prepared by dissolving six ounces (L.) or four ounces (D.) of sulphuret of potash, in one pound and a half of distilled water, and adding diluted sulphuric acid (L.), or diluted nitrous acid (D.), as long as there is any precipitation. The precipitate is then to be separated by the filter, and washed till it has lost all acidity, and then dried.

Similar in its nature to washed sublimed sulphur, but considered as rather milder.

828 Amber.

261. SUCCINUM, E. L. D. Amber. See CHEMISTRY, N° 2476.

Amber in its natural state is not employed in medicine, except to make the following

Officinal Preparations.

829 Succinic acid.

a. ACIDUM SUCCINI, E. SAL SUCCINI, D. L. Succinic acid. *Salt of amber.*

830 Oil of amber.

b. OLEUM SUCCINI, E. L. D. Oil of amber.

For the preparation and chemical properties of these substances, see CHEMISTRY, N° 724, *et seq.*

831 Purified salt of amber.

c. SAL SUCCINI PURIFICATUS, L. Purified salt of amber.

The London college directs this acid to be purified by boiling half a pound of it in a pint of distilled water, and setting aside the solution to crystallize.

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Succinic acid is now scarcely employed in medicine.

832 Purified oil of amber.

d. OLEUM SUCCINI PURISSIMUM, E. OLEUM SUCCINI RECTIFICATUM, L. D. Purified oil of amber.

The Edinburgh college directs oil of amber to be purified by distilling it in a glass retort with six times its quantity of water, till two-thirds of the water have passed into the receiver; when the pure volatile oil comes over, it is to be separated from the water, and preserved in vessels closely stopped. The processes of the other colleges do not materially differ from this.

Oil of amber is a powerful stimulant and antispasmodic, useful in hysterical and similar disorders. Dose 10 or 12 drops. Used also externally in paralysis and rheumatisms.

833 Petroleum.

262. BITUMEN PETROLEUM, E. PETROLEUM, L. PETROLEUM BARBADENSE, D. Petroleum or rock oil. *Barbadoes tar.*

Officinal Preparation.

834 Oil of petroleum.

a. OLEUM PETROLEI, L. Oil of petroleum.

Prepared by distilling petroleum in a sand bath.

Employed as a stimulant and antispasmodic. Dose from 10 to 30 drops. Also used as an external stimulant in strains and rheumatisms.

SECT. III. *Acids.*

835 Sulphuric acid.

263. ACIDUM SULPHURICUM, E. ACIDUM VITRIOLICUM, L. D. Sulphuric acid. *Vitriolic acid. Oil of vitriol.*

For the preparation and chemical properties of sulphuric acid, see CHEMISTRY, Chap. x. Sect. 1.

Undiluted sulphuric acid is seldom employed in medicine, except as an external stimulant and rubefacient, in combination with fatty substances.

Officinal Preparations.

836 Diluted sulphuric acid.

a. ACIDUM SULPHURICUM DILUTUM, E. ACIDUM VITRIOLICUM DILUTUM, L. D. Diluted sulphuric acid. *Diluted vitriolic acid. Spirit of vitriol.*

One part of sulphuric acid mixed with seven of water (E.), or one ounce with eight ounces of water (L.), or two ounces, with 14 ounces of water (D.).

Diluted sulphuric acid is employed as a refrigerant in fevers, astringent in hemorrhages, and tonic in dyspepsia. Dose from 20 drops to a dram.

837 Aromatic sulphuric acid.

b. ACIDUM SULPHURICUM AROMATICUM, E. Aromatic sulphuric acid. Elixir of vitriol.

Prepared by first mixing two pounds of alcohol with six pounds of sulphuric acid, by gradually dropping the acid into the alcohol; digesting this mixture with a very gentle heat in a close vessel, for three days; and adding one ounce and a half of bruised cinnamon, and one ounce of bruised ginger; digesting again in a close

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close vessel, for six days, and filtering the tincture through paper in a glass funnel.

An excellent stimulant and tonic, well suited to dyspeptic complaints. Dose from 15 to 40 drops.

838 Sulphate of potash.

c. SULPHAS POTASSÆ, E. KALI VITRIOLATUM, L. ALKALI VEGETABILE VITRIOLATUM, D. Sulphate of potash. *Vitriolated kali. Vitriolated vegetable alkali. Vitriolated tartar.*

For the nature and properties of this salt, see CHEMISTRY, N° 925, *et seq.*

The Edinburgh college directs this salt to be prepared by an immediate combination of sulphuric acid, diluted with six times its weight of water, with as much pure carbonate of potash, dissolved also in six times its weight of water, as is sufficient to neutralize the acid. The salt is procured from the solution by evaporation and crystallization. The other colleges obtain this salt by dissolving the saline mass that remains after the distillation of nitrous acid, filtering and crystallizing as before.

Sulphate of potash is a mild purgative, and may be given in a dose of four or five drams, but it requires a large quantity of water for its solution. It is employed chiefly to assist in the pulverization of opium, scammony, &c.

839 Sulphate of potash with sulphur.

d. SULPHAS POTASSÆ CUM SULPHURE, E. SAL POLYCHRESTUS. Sulphate of potash with sulphur. *Sal polychrest.*

Prepared by mixing together equal parts of powdered nitrate of potash and sublimed sulphur; injecting the mixture gradually into a red-hot crucible; and, when the deflagration ceases, allowing the salt to cool, and putting it into a vessel that is to be closely stopped.

Similar in its effects with the last, but more easily prepared.

SECT. IV. *Alkalies and Alkaline Salts.*

840 Impure carbonate of soda.

264. CARBONAS SODÆ IMPURUS, E. BARYLLA, L. D. Impure carbonate of soda. *Barilla. Fixed mineral alkali.*

Officinal Preparations.

841 Carbonate of soda.

a. CARBONAS SODÆ, E. NATRON PREPARATUM, L. ALKALI FOSSILE MITE, D. Carbonate of soda. *Vitriolated natron. Mild fossil alkali.*

Prepared by boiling impure carbonate of soda, bruised or powdered barilla, till all the salt is dissolved, then filtering the liquor, and setting it by to crystallize.

For an account of the nature and properties of this salt, see CHEMISTRY, N° 1085.

Employed in medicine chiefly as an antacid and lithontriptic. Dose from 10 to 30 grains.

842 Water of supercarbonate of soda.

b. AQUA SUPERCARBONATIS SODÆ, E. Water of supercarbonate of soda.

Prepared by passing a stream of carbonic acid gas through a solution of carbonate of soda, as was directed for preparing the water of carbonate of potash. See N° 315.

This preparation is supposed to be a powerful lithontriptic, and the occasional use of it certainly appears to prevent the formation of uric acid. It may be drunk in the quantity of half a pint or a pint during the day.

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843 Phosphate of soda.

c. PHOSPHAS SODÆ, E. Phosphate of soda.

For the preparation and nature of this salt, see CHEMISTRY, N° 1075, *et seq.*

An excellent laxative, preferable to most other saline catharties, from its taste being but little unpleasant. Dose from one to two ounces, which is best taken dissolved in soup, beef tea, or gruel.

844 Nitrate potash.

265. NITRAS POTASSÆ, E. NITRUM, L. D. Nitrate of potash. *Nitre. Saltpetre.* See CHEMISTRY, N° 942, *et seq.*

Nitrate of potash is used in medicine as a diaphoretic, diuretic, and refrigerant. Dose from five to 20 grains.

Officinal Preparations.

845 Purified nitre.

a. NITRUM PURIFICATUM, L. Purified nitre.

Purified by solution in boiling water, filtration, and crystallization.

846 Nitrous acid.

b. ACIDUM NITROSUM, E. L. D. Nitrous acid. *Fuming spirit of nitre.*

Prepared by decomposing nitrate of potash by sulphuric acid, in the manner mentioned under CHEMISTRY, Chap. x. Sect. 3.

It is in this state that the acid obtained from nitrate of potash is generally employed in medicine, though for certain purposes the nitric acid is to be preferred. These acids are employed as refrigerants and diuretics, largely diluted, and in small doses, viz. from five to 20 drops, and also as tonics and general stimulants, as mentioned below. Externally they act as stimulants or escharotics, according to their strength.

847 Diluted nitrous acid.

c. ACIDUM NITROSUM DILUTUM, E. L. D. Diluted nitrous acid. *Aquafortis.*

Prepared by mixing equal weights of nitrous acid and water, taking care to avoid the noxious fumes. Uses the same as of the last; but the diluted acid is better calculated for internal exhibition. Doses about double those of nitrous acid.

848 Nitric acid.

d. ACIDUM NITRICUM, E. Nitric acid.

Prepared by redistilling nitrous acid in a retort with an adapted receiver, with a very gentle heat, till the red portion has passed over, and the remaining acid has acquired the state of nitric acid. See CHEMISTRY as above.

This is the acid which has been so much recommended of late as a cure for syphilis, in which it is administered, diluted with water in the proportion of a dram to a pint, which is to be taken at intervals through the day, sucking it through a quill or glass tube, to avoid injuring the teeth, and gradually augmenting the quantity as far as the stomach will bear. Though the advantages of nitric acid in syphilitic complaints appear to have been overrated, it is no doubt a valuable succedaneum to mercury, and has, we believe, been of service in cases where mercurial preparations were inadmissible, or unsuccessful. Nitric acid, in its nascent state,

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state, as procured by an extemporaneous decomposition of nitre by sulphuric acid, has been found of advantage as a fumigation in correcting putrid effluvia.

849 Ointment of nitrous acid.

e. UNGUENTUM ACIDI NITROSI, E. Ointment of nitrous acid. *Oxygenated ointment.*

Prepared by gradually mixing six drams of nitrous acid with one pound of melted hog's lard, and continually agitating the mixture as it cools.

A good remedy in herpes, lepra, and some other cutaneous affections, and said to have succeeded as a substitute for mercurial ointment.

850 Spirit of nitrous ether.

f. SPIRITUS ÆTHERIS NITROSI, E. L. LIQUOR ÆTHEREUS NITROSUS, D. Spirit of nitrous ether. *Ethereal nitrous liquor. Sweet spirit of nitre.*

About three parts of alcohol and one of nitrous acid, gradually mixed together, distilling over the spirit from a water bath.

Diuretic, stimulant, and tonic. Dose 20 drops to a dram.

851 Muriate of soda.

266. MURIAS SODÆ, E. SAL MURIATICUS, L. SAL COMMUNIS, D. SAL MARINUS. Muriate of soda. *Sea salt. Common salt.* See CHEMISTRY, N° 1046.

Muriate of soda is employed as a laxative and anthelmintic. In the former way it is usually administered in clysters; in the latter it is given by the mouth, in the dose of half a dram to an ounce or more. Externally, when dried by heat, it is used as a stimulant and rubefacient.

Officinal Preparations.

852 Dried muriate of soda.

a. MURIAS SODÆ EXSICCATUS, E. SAL COMMUNIS EXSICCATUS, D. Dried muriate of soda.

Muriate of soda is dried by roasting it over the fire in a wide iron vessel, with occasional agitation, till it ceases to decrepitate.

853 Muriatic acid.

b. ACIDUM MURIATICUM, E. L. D. Muriatic acid. *Marine acid. Spirit of sea-salt.*

Prepared by decomposing muriate of soda by sulphuric acid, in the manner described under CHEMISTRY, Chap. x. Sect. 5.

Muriatic acid is used in medicine as a refrigerant, diuretic, and stimulant. Dose from 10 drops to 40 or 50. It is a good medicine in low fevers, largely diluted and sweetened with sugar. In its nascent state, as obtained by the extemporaneous decomposition of muriate of soda by sulphuric acid, it is an excellent fumigation, and in this respect is perhaps to be preferred to the nitric acid.

854 Sulphate of soda.

c. SULPHAS SODÆ, E. NATRON VITRIOLATUM, L. ALKALI FOSSILE VITRIOLATUM, D. SAL GLAUBERI. Sulphate of soda. *Vitriolated natron. Vitriolated mineral alkali. Glauber's salt.*

Usually prepared by dissolving and neutralizing the acidulous salt remaining after the preparation of muriatic acid, filtering the liquor, evaporating, and setting it aside to crystallize. See CHEMISTRY, N° 1030.

A good purgative, but not suited to all stomachs. Dose from one to two ounces.

267. SUBBORAS SODÆ. BORAS SODÆ, E. BORAX, L. D. Subborate of soda. *Borax.* See CHEMISTRY, N° 1067. History of Simple and Officinal Medicines.

Sometimes given internally as a diuretic; but generally employed as a detergent to aphthous crusts and ulcerations in the mouth and fauces, either by way of lotion, or made into a linctus with syrup or honey. 855 Subborate of soda.

SECT. V. *Soaps.*

268. SAPO HISPANUS. SAPO, E. Spanish or Castile soap. 856 Castile soap.

The Edinburgh and London colleges particularize the soap that should be used in medicine, as prepared of olive oil and soda.

On the nature and properties of soap, see CHEMISTRY.

Soap is employed both internally and externally. Internally it acts as a gentle laxative, and is supposed to possess lithontriptic powers. In this latter way it has been given in the quantity of from half an ounce to an ounce in the day. Excepting with this intention, it is seldom given alone. Externally it is used as a stimulant and detergent, under the various forms mentioned below.

Officinal Preparations.

a. TINCTURA SAPONIS, E. LINIMENTUM SAPONIS COMPOSITUM, L. LINIMENTUM SAPONACEUM, D. Tincture of soap. *Compound liniment of soap. Saponaceous liniment. Opodeldoc.* 857 Tincture of soap.

The Edinburgh tincture is prepared by digesting four ounces of soap shavings in two pounds of alcohol for three days; then adding to the filtered liquor two ounces of camphor, and half an ounce of volatile oil of rosemary, agitating them diligently. The London liniment is composed of three ounces of soap, one ounce of camphor, and one pint of spirit of rosemary; that of the Dublin college of two ounces of Castile soap, one ounce of camphor, eight ounces of alcohol, and the same of water, and two scruples of essential oil of rosemary.

b. TINCTURA SAPONIS ET OPII, E. LINIMENTUM ANODYNUM. Tincture of soap and opium. *Anodyne liniment.* 858 Tincture of soap and opium.

Prepared in the same manner as the last, with the addition, from the beginning, of one ounce of opium.

These tinctures or liniments are excellent stimulant applications in cases of sprains, rheumatic pains, and similar affections; and the latter of them has been found useful when applied to the tumid belly of children that are threatened with rickets.

c. CERATUM SAPONIS, L. D. Soap cerate. 859 Soap cerate.

Prepared by boiling one pound of powdered litharge with a gallon or eight pounds (D.) of vinegar, over a slow fire, with constant agitation, till the mixture combines and thickens; then adding eight ounces of soap, 10 ounces of yellow wax, and a pint or 14 ounces (D.) of olive oil, and continuing the heat and agitation till they are united to form a cerate.

d. EMPLASTRUM SAPONIS, L. EMPLASTRUM SAPONACEUM, E. D. Soap plaster. 860 Soap plaster.

Prepared by mixing one part of soap with six of melted

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melted litharge plaster (L. D.), or one part of sliced soap, with four of plaster of semivitrified oxide of lead, and two parts of gum plaster melted together (E.). These are intended as discutient applications.

Sect. VI. *Earths and Earthy Salts.*

861 Sulphate of baryta.

269. Sulphas Barytæ, E. TERRA PONDEROSA VITRIOLATA. BARYTES. Sulphate of Baryta. *Vitriolated ponderous earth. Barytes.* See Chemistry, N° 1256, *et seq.*

Employed in medicine only for preparing the muriate of baryta.

862 Carbonate of baryta.

270. Carbonas Barytæ, E. TERRA PONDEROSA. Carbonate of baryta. *Heavy spar.* See Chemistry, as above.

Officinal Preparations.

863 Muriate of baryta.

a. Murias Barytæ, E. Muriate of baryta.

Prepared by dissolving carbonate of baryta broken into small pieces in a mixture of one part of muriatic acid and three of water, filtering the liquor, evaporating and crystallizing. Where the carbonate of baryta cannot be procured, this salt is obtained from the sulphate, by a very complex process, for which see Duncan's Dispensatory, and Chemistry as above.

864 Solution of muriate of baryta.

b. Solutio Muriatis Barytæ, E. Solution of muriate of baryta.

Prepared by dissolving one part of crystallized muriate of baryta in three of water.

This has been recommended as a powerful stimulant and tonic, in a variety of diseases. We believe it has been of service in some cases of scrophula. Dose from five to ten drops, twice or thrice a-day.

865 Lime.

271. Calx, L. CALX VIVA, E. CALX RECENS USTA, D. Lime. *Quicklime.* See Chemistry, Chap. xiii. Sect. 1.

Lime in substance is scarcely employed in medicine, except by way of caustic, mixed with soft soap or potash.

Officinal Preparation.

a. Aqua Calcis, E. L. D. Lime-water.

866 Lime-water.

This is a saturated solution of fresh burnt quicklime in water. After being made, it should be kept in vessels that are not too large, and carefully stopped, that it may not imbibe carbonic acid from the air.

Lime-water is employed as an antacid and astringent, a tonic, and an anthelmintic. Dose internally from two to four ounces. As an anthelmintic it is used in the way of clyster, to destroy ascarides. It is also employed externally as a stimulant and detergent.

867 Liniment of lime-water.

b. Linimentum Aquæ Calcis. OLEUM LINI CUM CALCE, E. Liniment of lime, or *Lintseed oil with lime.*

Prepared by mixing equal parts of lintseed oil and lime-water.

A useful application to recent scalds and burns.

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272. Carbonas Calcis, E. Carbonate of lime. Carbonas Calcis mollior, E. CRETA, L. D. Chalk. Carbonas Calcis durior, E. MARMOR. Marble. See Chemistry, N° 1230, *et seq.*

Carbonate of lime in its soft state is much employed in medicine as an antacid, and when powdered or prepared, it is applied externally to scalds and burns, and to cancerous sores.

868 Carbonate of lime.

869 Chalk.

870 Marble.

Officinal Preparations.

871 Prepared carbonate of lime.

a. Carbonas Calcis præparatus, E. CRETA PRÆPARATA, L. D. Prepared carbonate of lime. *Prepared chalk.*

This is chalk reduced to a very fine powder by trituration, levigation, diffusion in water, filtration, and drying. Ordinary dose, as an antacid, from 15 grains to a dram.

872 Chalk potion.

b. Potio carbonatis Calcis, E. MISTURA CRETACEA, L. D. Chalk potion.

Prepared, according to the Edinburgh college, by triturating an ounce of prepared carbonate of lime with two ounces of mucilage of gum arabic, and half an ounce of double-refined sugar; then adding gradually two pounds and a half of water, and two ounces of spirit of cinnamon.

The London and Dublin mixture is prepared by mixing one ounce of prepared chalk, six drams of double-refined sugar, one ounce of powdered gum arabic, with two pints or 30 ounces (D.), of distilled water.

Employed as an antacid, especially in diarrhœa, accompanied by acidity in the intestinal canal. It may be taken *ad libitum.*

873 Troches of carbonate of lime.

c. Trochisci carbonatis Calcis, E. TROCHISCI CRETÆ, L. Troches of carbonate of lime. *Troches of chalk.*

Prepared of four ounces of carbonate of lime, one ounce of gum arabic, one dram of nutmeg, and six ounces of double-refined sugar, powdered together, and formed into a mass with water (E.); or, of four ounces of prepared chalk, two ounces of prepared crabs claws, half an ounce of cinnamon, and three ounces of double-refined sugar, powdered and made into a mass with mucilage of gum arabic (L.). Used as the preceding.

874 Compound powder of carbonate of lime.

d. Pulvis carbonatis Calcis compositus, E. PULVIS CRETÆ COMPOSITUS, L. Compound powder of carbonate of lime. *Compound powder of chalk.*

Prepared of four ounces of prepared carbonate of lime, half a dram of nutmeg, and half a dram of cinnamon powdered together (E.); or, of half a pound of prepared chalk, four ounces of cinnamon, three ounces of tormentil, and the same of gum arabic, and half an ounce of long pepper powdered separately, and mixed together (L.).

Used as antacids and tonics, in debility of the intestinal canal. Dose from 15 to 30 grains.

875 Water impregnated with fixed air.

e. Aqua Aeris fixi, D. Water impregnated with fixed air.

Prepared

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Prepared by passing a stream of carbonic acid gas arising from the decomposition of three ounces of powdered white marble, and one half pound of diluted vitriolic acid, mixed with an equal quantity of water, through six pounds of pure spring water, in a Nooth's apparatus, with occasional agitation.

An excellent tonic, refrigerant, and anti-emetic.

876 Solution of muriate of lime

f. SOLUTIO MURIATIS CALCIS, E. Solution of muriate of lime.

Prepared by dissolving nine ounces of white marble broken to pieces, in sixteen ounces of muriatic acid, mixed with eight ounces of water; digesting for half an hour, pouring off the liquor, evaporating to dryness, dissolving the residuum in $1\frac{1}{2}$ times its weight of water, and filtering the solution.

An excellent tonic, useful in cases of scrofula and schirrus. Dose from 30 to 60 drops, twice or thrice a-day.

877 Sulphate of magnesia.

273. SULPHAS MAGNESIÆ, E. MAGNESIA VITRIOLATA, L. D. SAL CATHARTICUS AMARUS. Sulphate of magnesia. *Vitriolated magnesia. Epsom salt.* See CHEMISTRY, Chap. xiii. Sect. 4.

Used as a purgative, in a dose of an ounce to an ounce and a half; as a tonic and gentle stimulant, in the dose of a dram or two diluted considerably, twice a-day.

Officinal Preparations.

878 Carbonate of magnesia.

a. CARBONAS MAGNESIÆ, E. MAGNESIA ALBA, L. D. Carbonate of magnesia. *White Magnesia.*

Prepared by decomposing sulphate of magnesia by an equal weight of carbonate of potash, each previously dissolved in twice its weight of warm water, strained, and then mixed, instantly adding eight times their weight of warm water; then boiling the liquor for a little with agitation, and when the heat is a little diminished, straining the liquor through linen, and well washing the powder that remains on the filter with warm water, and drying.

An excellent antacid, and in cases of acidity, a laxative; also a good anti-emetic, where the sickness is accompanied with acidity. Dose from half a dram to a dram.

879 Magnesia.

b. MAGNESIA, E. MAGNESIA USTA, L. D. Magnesia. *Burnt* or *calcined magnesia.*

This is pure magnesia, freed from carbonic acid, by keeping it in a red heat for two hours, and putting it up in closely stopped bottles.

Preferable to the former as an antacid, wherever the extrication of carbonic acid may be unpleasant, by producing flatulency, especially for children.

880 Troches of magnesia.

c. TROCHISCI MAGNESIÆ, L. Troches of magnesia.

Prepared by triturating together four ounces of burnt magnesia, two ounces of double refined sugar, and a scruple of powdered ginger, and forming a mass for troches, with mucilage of gum arabic.

881 Supersulphate of alumine and potash.

274. SUPERSULPHAS ALUMINÆ ET POTASSÆ. SULPHAS ALUMINÆ, E. ALUMEN, L. D. Supersulphate of alumina and potash. *Alum.* See CHEMISTRY, N° 1418, *et seq.* History of Simple Officinal Medicines.

Alum is employed both externally and internally as an astringent and tonic. Internally it is given chiefly in hæmorrhages; dose from ten grains to a scruple.

Officinal Preparations.

882 Purified alum.

a. ALUMEN PURIFICATUM, L. Purified alum.

Prepared by boiling one pound of alum with one dram of chalk, in a pint of distilled water, straining and crystallizing.

883 Dried sulphate of alumina.

b. SULPHAS ALUMINÆ EXSICCATUS, E. ALUMEN USTUM, L. Dried sulphate of alumina. *Burnt alum.*

Alum is freed from its water of crystallization by melting it over the fire in an earthen or iron vessel, and keeping it there till it ceases to boil.

Employed as an escharotic, to destroy fungous excrescences.

884 Compound alum water.

c. AQUA ALUMINIS COMPOSITA. L. Compound alum water.

Prepared by dissolving half a dram of alum, and the same of vitriolated zinc, in four ounces of distilled water.

Employed externally as a stimulant or astringent, especially in ophthalmia, and as an injection in leucorrhœa.

885 Compound powder of sulphate of alumina.

d. PULVIS SULPHATIS ALUMINÆ COMPOSITUS, E. PULVIS STYPTICUS. Compound powder of sulphate of alumina. *Styptic powder.*

Composed of four parts of sulphate of alumina, and one part of kino, rubbed together to a fine powder.

Astringent. Dose from 15 to 30 grains.

886 Alum curd.

e. CATAPLASMA ALUMINIS, L. COAGULUM ALUMINOSUM, D. Alum cataplasm. *Alum curd.*

Prepared by shaking any quantity of the white of egg with a piece of alum till a curd is formed.

A useful application to sore and watery eyes, spread on linen, and applied at bed-time.

887 French bole.

275. BOLUS GALLICUS, L. French bole.

A clayey earth, formerly employed as an antacid or absorbent.

SECT. VII. *Metals and Metallic Preparations.*

888 Arsenious acid.

275. ACIDUM ARSENIOSUM. OXIDUM ARSENIÆ, E. Arsenious acid. *Oxide of arsenic. White arsenic.* See CHEMISTRY, N° 1536, *et seq.*

For an excellent account of the effects of arsenic on the living body, the modes of obviating or counteracting them, and of its medical use, see Duncan's Dispensatory.

This substance is employed as a tonic in intermittent fever, but we consider it as a dangerous remedy. For the mode of preparing and exhibiting it, see Duncan's

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Duncan's Dispensatory as above, and *Thesaurus Medicaminum.*

889 Sulphuret of antimony.

276. SULPHURETUM ANTIMONII, E. ANTIMONIUM, L. STIBIUM, D. Sulphuret of antimony.

For the natural history and chemical nature of this substance, see MINERALOGY *Index*, and CHEMISTRY, Chap. xiv. Sect. 12.

In its natural state, sulphuret of antimony is not employed in human medicine, except to form the following

Officinal Preparations.

890 Prepared sulphuret of antimony.

a. SULPHURETUM ANTIMONII PRÆPARATUM, E. ANTIMONIUM PRÆPARATUM, L. STIBIUM PRÆPARATUM, D. Prepared antimony.

Reduced to a very fine powder in the same manner as chalk, &c.

891 Oxide of antimony with sulphur.

b. OXIDUM ANTIMONII CUM SULPHURE PER NITRATEM POTASSÆ, E. CROCUS ANTIMONII, L. STIBIUM NITRO CALCINATUM, D. Oxide of antimony with sulphur. *Crocus of antimony.*

Prepared by injecting into a red-hot crucible equal weights of sulphuret of antimony and nitrate of potash, powdered separately, and well mixed; separating the reddish matter that remains after the deflagration is over, from the whitish crust above it, and reducing the former to powder, which is to be well washed with hot water till it is tasteless. Scarcely employed in medicine, except as the basis of other preparations.

892 Vitrified oxide of antimony with sulphur.

c. OXIDUM ANTIMONII CUM SULPHURE VITRIFICATUM, E. ANTIMONIUM VITRIFICATUM, L. Vitrified oxide of antimony with sulphur. *Vitrified antimony. Glass of antimony.*

Prepared by gradually heating powdered sulphuret of antimony till it ceases to emit sulphurous fumes, and then melting it by an intense heat into a glass, which is to be poured out on a heated brass plate.

Employed by the London colleges as the basis of their antimonial wine.

893 Vitrified oxide of antimony with wax.

d. OXIDUM ANTIMONII VITRIFICATUM CUM CERA, E. Vitrified oxide of antimony with wax.

Made by adding to one part of melted yellow wax, eight parts of vitrified oxide of antimony with sulphur, and roasting the mixture over a gentle fire with continual agitation for about a quarter of an hour, then pouring out the mixture, and, when cold, grinding it to powder.

This is similar to a medicine that was much esteemed by Sir John Pringle, as a remedy in dysentery. Dose from two or three to 20 grains, according to the age and strength of the patient.

894 Brown antimonial sulphur.

e. SULPHUR STIBIATUM FUSCUM, D. KERMES MINERALIS. Brown antimonial sulphur. *Kermes mineral.*

For the preparations and nature of this substance, see CHEMISTRY, N° 1688.

895 Precipitated sulphuret of antimony.

f. SULPHURETUM ANTIMONII PRÆCIPITATUM, E. SULPHUR ANT. PRÆCIP. L. SULPHUR STIBIATUM RUFUM, D. Precipitated sulphuret of antimony.

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Prepared by dissolving two pounds of prepared sulphuret of antimony in four pounds of water of potash, mixed with three pounds of water, adding more, if necessary, in a covered iron pot, over a slow fire for three hours, frequently stirring with an iron spatula, straining the liquor while hot, and precipitating the sulphuret by diluted sulphuric acid; then washing and drying the precipitate. See CHEMISTRY, N° 1688.

Employed like the last as a diaphoretic. Dose two or three grains.

896 Muriate of antimony.

g. MURIAS ANTIMONII, E. ANTIMONIUM MURIATUM, L. STIBIUM MURIATUM CAUSTICUM, D. Muriate of antimony. *Muriated antimony. Butter of antimony.* See CHEMISTRY, p. 638.

Employed sometimes as a caustic, and for preparing the following substance.

897 Precipitated calx of antimony.

h. CALX STIBII PRÆCIPITATA, D. Precipitated calx of antimony. *Powder of algaroth.*

Prepared by adding eight ounces of muriated antimony to a filtered solution of eight ounces of mild vegetable alkali, in 40 pounds of water, washing and drying the precipitated powder.

898 Oxide of antimony with phosphate of lime.

i. OXIDUM ANTIMONII CUM PHOSPHATE CALCIS, E. PULVIS ANTIMONIALIS, L. PULVIS STIBIATUS, D. Oxide of antimony with phosphate of lime. *Antimonial powder.*

For the preparation and nature of this substance, see CHEMISTRY, N° 1686. It is considered as nearly the same with *James's powder.*

An excellent diaphoretic. Dose from five to ten grains.

899 Tartrate of antimony and potash.

k. TARTRAS ANTIMONII ET POTASSÆ. TARTRIS ANTIMONII, E. ANTIMONIUM TARTARISATUM, L. TARTARUM STIBIATUM, D. Tartrate of antimony and potash. *Tartarized antimony. Stibiated tartar. Emetic tartar* or *tartar emetic.* See CHEMISTRY, N° 1687, and Duncan's Dispensatory.

The Edinburgh and London colleges direct this to be prepared by boiling together three parts of oxide of antimony with sulphur, (see N° 891.) and four parts of super-tartrate of potash, for a quarter of an hour, in a glass vessel, straining the liquor, and setting it by to crystallize.

Emetic; dose two or three grains at once, or better half a grain or a grain at short intervals. Expectorant; dose half a grain, repeated at long intervals of two or three hours. Diaphoretic, in similar doses, combined with opium, &c. Alterative, in still smaller doses. Externally stimulant and rubefacient.

900 Wine of tartrite of antimony.

l. VINUM TARTRITIS ANTIMONII, E. VINUM ANTIMONII TARTARISATI, L. VINUM TARTARI STIBIATI, D. Wine of tartrite of antimony. *Wine of tartarized antimony.*

Prepared by dissolving tartrite of antimony and potash either immediately in Spanish white wine, or first in boiling water, and then adding the wine. The pro-

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portions of the colleges vary; those of Edinburgh being 24 grains of the salt to a pound of wine; of London and Dublin, 40 grains of salt to two ounces of boiling water, and eight ounces of wine; so that the former contains two grains in every ounce by weight, the latter four grains in every ounce by measure.

Doses of the Edinburgh wine as an emetic, an ounce, or an ounce and a half, or at intervals half an ounce; as an expectorant or diaphoretic, a dram or two. The London and Dublin wine may be taken in about half the above doses.

901 Antimonial wine.

m. VINUM ANTIMONII, L. Antimonial wine.

Prepared by digesting an ounce of vitrified antimony in powder, in a pint and a half of Spanish white wine, for 12 days, with frequent agitation and straining through paper.

This preparation might be omitted, as it is neither so easily prepared nor so certain as the last.

902 Calcined antimony.

n. ANTIMONIUM CALCINATUM, L. Calcined antimony. *Diaphoretic antimony.* See CHEMISTRY, N° 1690.

Formerly much employed as a diaphoretic in a dose of from five to 30 grains; but since the introduction of James's powder and the analogous preparations, nearly disused.

903 Compound antimonial pills.

o. PILULÆ STIBII COMPOSITÆ, D. PILULÆ PLUMMERI. Compound antimonial pills. *Plummer's pills.*

Prepared by triturating together three ounces of precipitated sulphur of antimony, and the same of mild muriate of mercury; then adding a dram of extract of gentian, and the same of hard Spanish soap, and forming a mass with soap jelly.

Formerly in great repute as an alterative.

904 Mercury.

277. HYDRARGYRUM, D. HYDRARGYRUS, E. L. ARGENTUM VIVUM. Mercury. *Quicksilver.*

For an account of the chemical nature and properties of mercury, and the modes of ascertaining its purity, see CHEMISTRY, p. 642.

We shall first notice the several officinal preparations of mercury, and then subjoin a sketch of its uses and the cases to which it is best adapted.

Officinal Preparations.

905 Purified mercury.

a. HYDRARGYRUM PURIFICATUM, D. HYDRARGYRUS PURIFICATUS, E. L.

The Edinburgh process is to rub together four parts of quicksilver, and one part of iron filings, and distil from an iron vessel.

906 Acetate of mercury.

b. ACETAS HYDRARGYRI. ACETIS HYDRARGYRI, E. HYDRARGYRUM ACETATUM, D. HYDRARGYRUS ACETATUS, L. Acetate of mercury. *Acetated mercury.* See CHEMISTRY, N° 1749.

Scarcely employed at present, except as an external stimulant or discutient.

907 Muriate of mercury.

c. MURIAS HYDRARGYRI, E. HYDRARGYRUM MURIATUM CORROSIVUM, D. HYDRARGYRUS MURIATUS, L. Muriate of mercury. *Corrosive muriated mercury. Corrosive sublimate.* See CHEMISTRY, N° 1736.

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Prepared by boiling two pounds of purified quicksilver in two pounds and a half of sulphuric acid, in a glass vessel, over a sand bath, to dryness, triturating the dried mass when cold with four pounds of dried muriate of soda, then subliming in a glass cucurbit with a heat gradually increased, and separating the sublimed matter from the scoriæ.

Used as a sialagogue; dose one-eighth to one-fourth of a grain; as an external stimulus or escharotic to venereal ulcers, chancres, and herpetic eruptions, in the proportion of about a grain or more to the ounce of liquid.

908 Submuriate of mercury.

d. SUBMURIAS HYDRARGYRI, E. HYDRARGYRUM MURIATUM MITE SUBLIMATUM, D. CALOMELAS, L. Submuriate of mercury. *Sublimed mild muriate of mercury. Calomel.* See CHEMISTRY, N° 1742, where the process is much the same as that of the Edinburgh college.

Given in most cases where mercury is indicated. Dose, as a diaphoretic or alterative, about a grain; as a cathartic or anthelmintic, three to 10 grains; as a sialagogue, one or two grains twice a-day.

909 Precipitated submuriate of mercury.

e. SUBMURIAS HYDRARGYRI PRÆCIPITATUS, E. HYDRARGYRUM MURIATUM MITE PRÆCIPITATUM, D. HYDRARGYRUS MURIATUS MITE, L. Precipitated submuriate of mercury. *Precipitated mild muriate of mercury.*

Procured by adding to a solution of half a pound of purified quicksilver in the same weight of diluted nitrous acid, a solution of four pounds and a half of muriate of soda in eight pounds of boiling water; washing and drying the precipitate.

Much the same in its effects and doses as the foregoing.

910 White calx of mercury.

f. CALX HYDRARGYRI ALBA, L. White calx of mercury. *White precipitate.*

Prepared by dissolving first half a pound of sal ammoniac, and then half a pound of muriated mercury, in distilled water, adding to the mixed solution half a pound of water of prepared kali, filtering and washing and drying the precipitate. See Duncan's Dispensatory.

911 Ointment of white calx of mercury.

g. UNGUENTUM CALCIS HYDRARGYRI ALBÆ, L. Ointment of white calx of mercury.

Prepared by mixing a dram of the foregoing with an ounce and a half of ointment of hog's lard.

Used to destroy vermin, and in some cutaneous eruptions.

912 Cinereous oxide of mercury.

h. OXIDUM HYDRARGYRI CINEREUM, E. PULVIS HYDRARGYRI CINEREUS, D. Cinereous oxide of mercury.

Prepared by dissolving four parts of purified quicksilver in five parts of diluted nitrous acid; then gradually adding 15 parts of distilled water, and pouring in a sufficient quantity of water of carbonate of ammonia to precipitate the whole of the oxide, which is to be washed and dried.

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A mild sialagogue and alterative. Dose from one to five grains. Used also as a fumigation in syphilitic eruptions, &c.

913 Ointment of cinereous oxide of mercury.

i. UNGUENTUM OXIDI HYDRARGYRI CINEREI, E. Ointment of cinereous oxide of mercury.

Composed of one part of the foregoing, and three parts of hog's lard. Used for mercurial inunction.

914 Quicksilver with chalk.

k. HYDRARGYRUS CUM CRETA, L. Quicksilver with chalk.

Prepared by triturating together three parts of purified quicksilver and five parts of prepared chalk, till the globules disappear.

A mild alterative. Dose from 10 to 30 grains.

915 Calcined mercury.

l. HYDRARGYRUM CALCINATUM, D. HYDRARGYRUS CALCINATUS, L. Calcined mercury. See CHEMISTRY, N° 1709.

A violent sialagogue. Dose half a grain to a grain.

916 Red oxide of mercury.

m. OXIDUM HYDRARGYRI RUBRUM PER ACIDUM NITRICUM, E. HYDRARGYRUS NITRATUS RUBER, L. HYDRARGYRUM SUBNITRATUM, D. Red oxide of mercury *by nitric acid. Red nitrated mercury. Red precipitate.* See CHEMISTRY, N° 1709.

Used as a stimulant or an escharotic in fungous ulcers, &c.

917 Ointment of red oxide of mercury.

n. UNGUENTUM OXIDI HYDRARGYRI RUBRI, E. Ointment of red oxide of mercury.

Composed of one part of the foregoing reduced to fine powder, and eight parts of hog's lard.

918 Yellow subsulphate of mercury.

o. SUBSULPHAS HYDRARGYRI FLAVUS, E. HYDRARGYRUM SUBVITRIOLATUM, D. HYDRARGYRUS VITRIOLATUS, L. Yellow subsulphate of mercury. *Subvitriolated mercury. Turpeth mineral.* See CHEMISTRY, N° 1720.

Employed chiefly as an errhine, mixed with liquorice powder or cephalic snuff.

919 Black sulphuret of mercury.

p. SULPHURETUM HYDRARGYRI NIGRUM, E. HYDRARGYRUM SULPHURATUM NIGRUM, D. HYDRARGYRUS CUM SULPHURE, L. Black sulphuret of mercury. *Mercury with sulphur. Ethiops mineral.*

Prepared by triturating together in a glass mortar with a glass pestle, equal weights of purified quicksilver, and sublimed sulphur, till the globules of the former disappear. See CHEMISTRY, N° 1712.

Employed chiefly as an alterative in cutaneous diseases and glandular affections. Dose from five or 10 grains to a dram or more.

920 Red sulphuret of mercury.

q. HYDRARGYRUM SULPHURATUM RUBRUM, D. HYDRARGYRUS SULPHURATUS RUBER, L. Red sulphuret of mercury. *Factitious cinnabar. Vermilion.* See CHEMISTRY, N° 1713.

Used principally as a fumigation for venereal ulcers in the nose, mouth, and throat, and as an ingredient in an ointment for the itch.

r. PILULÆ HYDRARGYRI, E. L. D. Mercury pills.

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921 Mercury pills.

Prepared by triturating an ounce of purified quicksilver with the same weight of conserve of red roses in a glass mortar, till the globules completely disappear, adding occasionally a little mucilage of gum arabic, then adding two ounces of starch, and beating the whole with a little water into a mass, to be immediately divided into 480 equal pills (E). The London pills are composed of two drams of purified quicksilver, three drams of conserve of roses, and one dram of powdered liquorice; and the Dublin pills of three drams of quicksilver, the same of extract of liquorice, and a dram and a half of purified liquorice root.

Four grains of the Edinburgh mass, three of the London, and two and a half of the Dublin, contain about one grain of mercury, so that the last are nearly twice as strong as the first. Dose of the Edinburgh pills as a sialagogue, from three to six, once or twice a day.

922 Mercurial ointment.

s. UNGUENTUM HYDRARGYRI, E. Mercurial ointment. *Blue ointment.*

Prepared by triturating together one part of quicksilver with a little hog's lard, till the globules disappear; then adding one part of mutton suet, and as much hog's lard as with the first quantity, is equal to three parts. Also formed with double or treble the quantity of mercury.

Used for mercurial inunction. Quantity to be used at once about four scruples or drams every other night, or every night.

923 Stronger mercurial ointment.

t. UNGUENTUM HYDRARGYRI FORTIUS, L. D. Stronger mercurial ointment.

Composed of two pounds of purified quicksilver, 23 ounces of prepared hog's lard, and an ounce of prepared mutton suet.

Quantity used at once, about two scruples or a dram.

924 Milder mercurial ointment.

u. UNGUENTUM HYDRARGYRI MITIUS, L. D. Milder mercurial ointment. *Trooper's ointment.*

Formed of one part of the foregoing, and two of prepared hog's lard. Used chiefly to destroy vermin, or for some cutaneous affections.

925 Mercurial plaster.

v. EMPLASTRUM HYDRARGYRI, E. Mercurial plaster.

Formed by melting one part of olive oil, and the same of white rosin together; and when the mixture is cold, rubbing with it three parts of quicksilver till the globules disappear, afterwards adding by degrees six parts of melted plaster of semivitrified oxide of lead, and mixing the whole carefully together.

926 Plaster of gum ammoniac with mercury.

w. EMPLASTRUM AMMONIACI CUM HYDRARGYRO, L. Plaster of gum ammoniac with mercury.

Prepared by triturating together three ounces of purified quicksilver, with about a dram of sulphurated oil, till the globules disappear, and then adding gradually one pound of strained gum ammoniac melted.

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x. EMPLASTRUM LITHARGYRI CUM HYDRARGYRO, L. Litharge plaster with mercury.

Composed of three ounces of purified quicksilver, about a dram of sulphurated oil, and a pound of melted lithargc plaster.

927 Litharge plaster with mercury.

These three last are employed as resolvents and discutients, in cases of venereal nodes and beginning indurations.

928 Ointment of nitrate of mercury.

y. UNGUENTUM NITRATIS HYDRARGYRI, E. UNGUENTUM HYDRARGYRI NITRATI, L. D. UNGUENTUM CITRINUM. Ointment of nitrate of mercury. *Citrine ointment.*

Prepared by first dissolving one part of quicksilver in two of nitrous acid, and beating up the solution in a glass mortar, with nine parts of olive oil, and three of hog's lard, previously melted together (or with 12 parts of hog's lard, L. D.) till the whole is formed into an ointment.

A powerful stimulant and detergent ointment, useful in inflammation and ulceration of the eyelids, and in cutaneous affections.

929 Milder ointment of nitrate of mercury.

z. UNGUENTUM NITRATIS HYDRARGYRI MITIUS, E. Milder ointment of nitrate of mercury.

Prepared in the same way as the last, except using three times the quantity of oil and lard.

Mercury, or some of its preparations, is exhibited, 1. As an errhine, the subsulphate of mercury; 2. As a sialagogue, mercury in almost any form; 3. As a cathartic, the submuriate of mercury; 4. As a diuretic, the oxides, the muriate, and the submuriate, combined with other diuretics; 5. As a sudorific, calomel conjoined with a sudorific regimen; 6. As an emmenagogue; 7. As an astringent, muriate of mercury; 8. As a stimulant, muriate of mercury; 9. As an antispasmodic; 10. As an anthelmintic.

With some of these views, mercury is frequently exhibited, 1. In febrile diseases; in obstinate agues. 2. In inflammatory diseases, in indolent and chronic inflammations, especially of the glandular viscera, as the liver, spleen, &c. 3. In exanthematous diseases, variola. 4. In profluvia; in dysentery. 5. In spasmodic diseases; tetanus, trismus, hydrophobia, &c. 6. In cachectic diseases; anasarca, ascites, hydrothorax, hydrocephalus, &c. 7. In impetigines, scrophula, syphilis, lepra, icterus, &c. 8. In local diseases; in caligo corneæ, amaurosis, gonorrhœa, obstipatio, amenorrhœa suppressionis, tumours of various kinds, herpes, tinea, psora, &c. *

* *Duncan's Dispensatory.*

For a more particular account of the medical effects and uses of mercury, we refer our readers to Cullen's Materia Medica, vol. ii. The Practical Synopsis, vol. i. The *Theasaurus Medicaminum*, and Murray's Elements, vol. i.

930 Zinc.

278. ZINCUM, E. L. D. Zinc. See CHEMISTRY, p. 649.

Officinal Preparations.

931 Oxide of zinc.

a. OXIDUM ZINCI, E. ZINCUM CALCINATUM, L. CALX ZINCI, E. FLORES ZINCI. Oxide of zinc. *Flowers of zinc.* See CHEMISTRY, N° 1756.

Employed as a tonic and antispasmodic, chiefly in epilepsy. Dose from three to 10 grains, three or four times a day.

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b. UNGUENTUM OXIDI ZINCI, E. Ointment of oxide of zinc.

932 Ointment of oxide of zinc.

Composed of one part of the foregoing, and six parts of simple liniment.

Applied to the eye as an astringent, in cases of ophthalmia, attended with debility and relaxation of the vessels.

933 Sulphate of zinc.

c. SULPHAS ZINCI, E. ZINCUM VITRIOLATUM, L. D. Sulphate of zinc. *Vitriolated zinc. White vitriol.* See CHEMISTRY, N° 1764.

Employed internally as an emetic, in the dose of from 10 to 30 grains, and as an astringent and tonic in a dose of from two to five grains, several times a day. Externally as a stimulant and astringent, in the form of lotion, collyrium, or injection.

934 Solution of sulphate of zinc.

d. SOLUTIO SULPHATIS ZINCI, E. Solution of sulphate of zinc.

Prepared by dissolving 16 grains of sulphate of zinc in eight ounces of water; then adding 16 drops of diluted sulphuric acid, and filtering through paper.

Used in most cases where the sulphate of zinc is employed externally.

935 Water of vitriolated zinc with camphor.

e. AQUA ZINCI VITRIOLATI CUM CAMPHORA, L. Water of vitriolated zinc with camphor.

Composed of half an ounce of vitriolated zinc, half an ounce by measure of camphorated spirit, and two pints of boiling water, mixed together, and filtered through paper.

Used for an astringent lotion and collyrium.

936 Solution of acetite of zinc.

f. SOLUTIO ACETITIS ZINCI, E. Solution of acetite of zinc.

Prepared by mixing together a solution of one dram of sulphate of zinc, in 10 ounces of distilled water, and a solution of four scruples of acetate of lead in 10 ounces of distilled water, allowing them to stand for some time at rest, and filtering.

An excellent astringent collyrium.

937 Impure oxide of zinc.

279. OXIDUM ZINCI IMPURUM, E. TUTIA, L. D. Impure oxide of zinc. *Tutty.* See MINERALOGY *Index*.

Officinal Preparations.

938 Prepared impure oxide of zinc.

a. OXIDUM ZINCI IMPURUM PRÆPARATUM, E. TUTIA PRÆPARATA, L. D. Prepared impure oxide of zinc. *Prepared tutty.*

Prepared in the same way as chalk, and other hard substances.

939 Ointment of impure oxide of zinc.

b. UNGUENTUM OXIDI ZINCI IMPURI, E. UNGUENTUM TUTIÆ, L. D. Ointment of impure oxide of zinc. *Tutty ointment.*

Composed of one part of the foregoing, and five parts of simple liniment (E.), or of any quantity of the foregoing, and as much ointment of spermaceti, or of hog's

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hog's lard as is sufficient to form a soft ointment (L. D.)

Used in similar cases with N° 932.

940 Impure carbonate of zinc.

280. CARBONAS ZINCI IMPURUS, E. LAPIS CALAMINARIS, L. D. Impure carbonate of zinc. *Calamine.* See MINERALOGY *Index.*

Officinal Preparations.

941 Prepared impure carbonate of zinc.

a. CARBONAS ZINCI IMPURUS PRÆPARATUS, E. LAPIS CALAMINARIS PRÆPARATUS, L. D. Prepared carbonate of zinc. *Prepared calamine.*

Prepared as chalk, &c.

942 Cerate of impure carbonate of zinc.

b. CERATUM CARBONATIS ZINCI IMPURI, E. CERATUM LAPIDIS CALAMINARIS, L. D. CERATUM EPULOTICUM. Cerate of impure carbonate of zinc. *Calamine cerate. Epulotic cerate. Brown cerate. Turner's cerate.*

Composed of one part of the foregoing, and five parts of simple cerate (E.), or of half a pound (L.), or one part (D.) of the foregoing, the same of yellow wax, and a pint (L.) or two parts (D.) of olive oil.

Employed chiefly as a dressing to sores and ulcers.

943 Tin.

281. STANNUM, E. L. D. Tin. See CHEMISTRY, p. 653.

Officinal Preparations.

944 Powder of tin.

a. STANNI PULVIS, L. D. Powder of tin.

Prepared by granulating melted tin by agitation in a covered wooden box rubbed with chalk; or by stirring while melted over the fire till it be reduced to a powder.

Employed as a mechanical anthelmintic, especially in cases of tænia and lumbricus. Dose from two drams to half an ounce.

945 Lead.

282. PLUMBUM, E. L. D. Lead. See CHEMISTRY, p. 657.

946 White oxide of lead.

OXIDUM PLUMBI ALBI, E. CERUSSA, L. D. White oxide of lead. *Cerusc. White lead.* See CHEMISTRY, N° 1856.

Officinal Preparations.

947 Compound powder of ceruse.

a. PULVIS CERUSSÆ COMPOSITUS, L. Compound powder of ceruse.

Composed of five ounces of ceruse, half an ounce of sarcocol, and half an ounce of gum-tragacanth, powdered together.

Intended as an external discutient, but inferior for that purpose to the solutions of the salts of lead.

948 Ointment of white oxide of lead.

b. UNGUENTUM OXIDI PLUMBI ALBI, E. UNGUENTUM ALBUM. Ointment of white oxide of lead. *White ointment.*

Composed of five parts of simple ointment, and one of white oxide of lead.

A cooling desiccative ointment, forming a useful application in cases of excoriation.

949 Superacetate of lead.

c. SUPERACETAS PLUMBI. ACETIS PLUMBI, E. CERUSSA ACETATA, L. D. SACCHARUM SATURNI. Superacetate of lead. *Acetated ceruse. Sugar of lead.* See CHEMISTRY, N° 1858.

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Chiefly employed in solution as an external refrigerant or astringent, by way of lotion, collyrium, or injection. Its external use being highly dangerous, ought to be entirely abandoned.

950 Ointment of acetite of lead.

d. UNGUENTUM ACETITIS PLUMBI, E. UNGUENTUM CERUSSÆ ACETATÆ, L. D. UNGUENTUM SATURNINUM. Ointment of acetite of lead. *Ointment of acetated ceruse. Saturnine ointment.*

Composed of one part of the foregoing, and 20 parts of simple ointment (E.) or two drams of the foregoing. two ounces of white wax, and half a pint or half a pound of olive oil (L. D.).

A useful refrigerant ointment.

951 Red oxide of lead.

283. OXIDUM PLUMBI RUBRUM, E. MINIUM, L. Red oxide of lead. *Red lead.* See CHEMISTRY, N° 1832.

This is now scarcely employed in medicine.

952 Semivitrified oxide of lead.

284 OXIDUM PLUMBI SEMIVITREUM, E. LITHARGYRUS, L. D. Semivitrified oxide of lead. *Litharge.* See CHEMISTRY, N° 1834.

Officinal Preparations.

953 Prepared litharge.

a. LITHARGYRUS PRÆPARATUS, E. D. Prepared litharge.

Reduced to an impalpable powder by levigation, &c. in the usual manner.

954 Water of acetated litharge.

b. AQUA LITHARGYRI ACETATI, L. LIQUOR LITHARGYRI ACETATI, D. EXTRACTUM SATURNI. Water of acetated litharge. *Extract of lead.*

Prepared by mixing two pounds four ounces of litharge with a gallon of distilled vinegar, boiling to six pints with constant agitation, then setting it aside till the feces have subsided, and then straining.

955 Compound water of acetated litharge.

c. LIQUOR LITHARGYRI ACETATI COMPOSITUS, D. AQUA LITHARGYRI ACETATI COMPOSITA, L. Compound water of acetated litharge.

Prepared by mixing a dram of the foregoing with a dram of proof spirit, and adding 14 ounces or a pint of distilled water.

This is intended as a refrigerant application, and is attended with effects similar to those of the superacetate of lead, from which it however differs in its chemical nature.

956 Compound cerate of acetated litharge.

d. CERATUM LITHARGYRI ACETATI COMPOSITUM, L. CERATUM LITHARGYRI ACETATI, D. Compound cerate of acetated litharge.

Prepared by rubbing half a dram of camphor with a little olive oil, and in the mean time adding gradually two ounces and a half of acetated litharge to a melted mixture of four ounces of yellow wax, and nine ounces of olive oil, stirring it till cold; and lastly adding the camphorated oil. Formerly much employed as a refrigerant application, but differing in little, except in consistence,

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consistence, from the other combinations of lead with fatty matters.

957 Plaster of semivitrified oxide of lead.

c. EMPLASTRUM OXIDI PLUMBI SEMIVITREI, E. EMPLASTRUM LITHARGYRI, L. D. EMPLASTRUM COMMUNE. Plaster of semivitrified oxide of lead. *Litharge plaster. Common plaster. Diachylum plaster.*

Prepared by boiling together over a slow fire, one part of semivitrified oxide of lead in powder, and about two parts of olive oil, adding a little hot water from time to time, and constantly agitating till the litharge and oil are uniformly mixed.

This plaster has been long employed to cover excoriated surfaces, and to form plasters for supporting the teguments in the neighbourhood of sores and ulcers.

For the ill effects of lead as a poison, see Fothergill's "Cautions concerning Poisons of Lead and Copper."

958 Iron.

285. FERRUM, E. L. D. Iron. See CHEMISTRY, p. 664.

Officinal Preparations.

959 Purified filings of iron.

a. FERRI LIMATURÆ PURIFICATÆ, E. Purified filings of iron.

Filings of iron are purified by placing a sieve over them, and attracting the purer particles through the sieve by means of a good magnet.

Sometimes employed internally as a tonic and anthelmintic, but their use is attended with an unpleasant extrication of hydrogenous gas.

960 Purified black oxide of iron.

b. FERRI OXIDUM NIGRUM PURIFICATUM, E. FERRI SQUAMÆ PURIFICATÆ. Purified black oxide of iron. *Purified scales of iron.*

This is a preparation of the scales of iron that collect about a smith's anvil, by the magnet.

A better medicine than the former, as it is not attended with the extrication of hydrogen gas. Dose from five grains to a scruple.

961 Carbonate of iron.

c. CARBONAS FERRI, E. FERRI RUBIGO, L. D. Carbonate of iron. *Rust of iron.* See CHEMISTRY, N° 1886, and 1929.

A good tonic, useful in general debility, and in uterine obstructions dependent on debility. Dose about a scruple, several times a day.

962 Water of aërated iron.

d. AQUA FERRI AERATI, D. Water of aërated iron.

This is an artificial chalybeate water, prepared in the same manner as N° 875. with the addition of a coil of fine iron wire suspended in the water.

An excellent tonic, forming a good substitute for the natural chalybeate waters. Dose a glass or two, twice or thrice a day.

963 Wine of iron.

e. VINUM FERRI, L. VINUM FERRATUM, D. Wine of iron. *Chalybeate wine.*

Prepared by digesting four ounces of iron filings in four pints of Spanish white wine, for a month, with frequent agitation, and then straining the liquor.

A tonic formerly much used in chlorotic cases. Dose from a dram to half an ounce.

f. SULPHAS FERRI, E. FERRUM VITRIOLATUM, L. D. SAL MARTIS. Sulphate of iron. *Vitriolated iron. Salt of steel.* See CHEMISTRY, N° 1903.

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964 Sulphate of iron.

A good tonic, but apt to disagree with the stomach and bowels. Dose from half a grain to one grain several times a day.

965 Tincture of muriate of iron.

g. TINCTURA MURIATIS FERRI, E. TINCTURA FERRI MURIATI, L. D. Tincture of muriate of iron.

The Edinburgh tincture is prepared by digesting three ounces of purified black oxide of iron in powder, and ten ounces of muriatic acid, with a gentle heat; then adding, after the powder is dissolved, as much alcohol as will make the whole liquor amount to two pounds and a half. The preparations of the other colleges do not materially differ from this. Dose from 10 to 20 drops, twice or thrice a day.

966 Tartarized iron.

h. FERRUM TARTARISATUM, L. *Tartarized iron.*

Prepared by mixing one pound of iron filings, and two pounds of powdered crystals of tartar, into a thick mass with distilled water, exposing them to the air for eight days in a wide glass vessel, and then drying the matter in a sand bath, and grinding to a very fine powder. See CHEMISTRY, p. 671. Dose from 10 to 30 grains.

967 Native sulphate of iron.

286. SULPHAS FERRI NATIVUS. Native sulphate of iron. *Green vitriol. Green copperas.*

Officinal Preparations.

968 Dried sulphate of iron.

a. SULPHAS FERRI EXSICCATUS, E. Dried sulphate of iron.

Prepared by exposing any quantity of sulphate of iron to the action of a moderate heat, in an unglased earthen vessel, till it becomes white and perfectly dry.

969 Red oxide of iron.

b. OXIDUM FERRI RUBRUM, E. Red oxide of iron. *Colcothar of vitriol.*

Prepared by exposing the foregoing preparation to an intense heat till it is converted into a very red matter.

970 Plaster of red oxide of iron.

c. EMPLASTRUM OXIDI FERRI RUBRI, E. EMPLASTRUM ROBORANS. Plaster of red oxide of iron. *Strengthening plaster.*

Prepared by grinding eight parts of red oxide of iron with three of olive oil; and then adding them to a melted mixture of 24 parts of plaster of semivitrified oxide of lead, six parts of white rosin, and three of yellow wax.

Used as an external application, spread on linen or leather, in weaknesses of the back and loins.

971 Muriate of ammonia and iron.

d. MURIAS AMMONIÆ ET FERRI, E. FERRUM AMMONIACALE, L. Muriate of ammonia and iron.

Prepared by mixing equal weights of red oxide of iron, washed and dried, and muriate of ammonia, and subliming, E. Dose from three to ten grains.

972 Tincture of ammoniacal iron.

e. TINCTURA FERRI AMMONIACALIS, L. Tincture of ammoniacal iron.

Prepared

History of Simple and Officinal Medicines.

Prepared by digesting four ounces of the preceding, with a pint of proof spirit, and straining.

Used in similar cases with the tincture of muriate of iron, which is, however, to be preferred to it.

973 Tincture of acetated iron.

f. TINCTURA FERRI ACETATI, D. Tincture of acetated iron.

Prepared by rubbing together in a glass mortar, acetated vegetable alkali, and vitriolated iron, of each an ounce, till the mass deliquesces, and then adding during the trituration two pounds of alcohol, and straining the solution.

A powerful astringent and tonic. Dose 20 or 30 drops.

The preparations of iron, given in a moderate dose, gradually raise the pulse, improve the colour of the face, and increase the alvine, urinary, and cuticular excretions. Their taking proper effect is denoted by fetid eructations and black stools.

These tonics are indicated chiefly in cases of preternatural discharges, or suppression of natural secretions or excretions, proceeding from a languor and sluggishness of the fluids, and general weakness of the solids. They are therefore useful in passive hæmorrhages, in dyspepsia, hysteria, and chlorosis; in most of the cachexiæ, in cancerous affections, and in the general debility that often remains after acute diseases or excessive hæmorrhages.

The preparations of iron, when given too largely, or improperly, produce headach, anxiety, heat of skin, and not unfrequently hæmorrhages or vomiting, pains in the stomach, and spasms and pains in the bowels. They are improper wherever the circulation is already too quick, the solids too tense and rigid; and where there is any stricture and spasmodic contractions of the vessels.

974 Copper.

287. CUPRUM, E. L. D. Copper. See CHEMISTRY, p. 674.

975 Subacetate of copper.

SUBACETAS CUPRI. SUBACETIS CUPRI, E. ÆRUGO. Subacetate of copper. *Verdigris.* See CHEMISTRY, N° 1995.

Employed chiefly as an escharotic, to destroy callous edges or fungous flesh, or as a stimulant to foul ulcers.

Officinal Preparations.

976 Prepared verdigris.

a. ÆRUGO PRÆPARATA, L. D. Prepared verdigris.

Prepared like other substances not soluble in water.

977 Oxymel of verdigris.

b. OXYMEL ÆRUGINIS, L. Oxymel of verdigris.

Prepared by dissolving one ounce of prepared verdigris in seven ounces of vinegar, straining through linen, and boiling with 14 ounces of clarified honey to a proper consistence.

Sometimes used as a detergent gargle to venereal ulcerations of the mouth and tonsils, but with much precaution. More generally employed, mixed with some stimulant ointment, as an external stimulant and escharotic.

c. UNGUENTUM SUBACETITIS CUPRI, E. Ointment of subacetite of copper. History of Simple and Officinal Medicines.

Prepared by mixing 15 parts of resinous ointment, and one part of subacetite of copper.

978 Ointment of subacetite of copper.

d. LIQUOR CUPRI AMMONIATI, D. AQUA CUPRI AMMONIATI, L. AQUA SAPPHARINA. Water of ammoniated copper. *Sapphire water.*

979 Water of ammoniated copper.

Prepared by the Dublin college, by mixing four grains of prepared verdigris, and two scruples of sal ammoniac, with eight ounces of fresh made lime water, digesting for 24 hours, and pouring off the clear liquor.

Used as a stimulant and detergent lotion.

980 Sulphate of copper.

288. SULPHAS CUPRI, E. CUPRUM VITRIOLATUM, D. VITRIOLUM CŒRULEUM. Sulphate of copper. *Vitriolated copper. Blue* or *Roman vitriol. Blue stone.* See CHEMISTRY, N° 1972.

Sometimes given internally as an emetic, in the dose of from two to five grains, and as a tonic, a grain or two, several times a-day; but its internal use is dangerous. More frequently employed as an escharotic.

Officinal Preparations.

981 Compound solution of sulphate of copper.

a. SOLUTIO SULPHATIS CUPRI COMPOSITA, E. AQUA STYPTICA. Compound solution of sulphate of copper. *Styptic water.*

Prepared by boiling three ounces of sulphate of copper, and the same of sulphate of alumina, in two pounds of water, till they are dissolved; then adding one ounce and a half of diluted sulphuric acid to the liquor previously filtered.

Employed chiefly as a styptic for stopping superficial hæmorrhages, or bleedings at the nose.

982 Ammoniaret of copper.

b. AMMONIARETUM CUPRI, E. CUPRUM AMMONIATUM, D. Ammoniaret of copper. *Ammoniated copper.*

Prepared by the Edinburgh college, by rubbing two parts of the purest sulphate of copper with three parts of carbonate of ammonia carefully together, in a glass mortar, till the effervescence has entirely ceased, and they unite into a violet-coloured mass, which is to be wrapt up in blotting paper, and dried, first upon a chalk stone, and afterwards by a gentle heat, and put into a phial that is to be closely stopped.

Employed as a tonic and antispasmodic, chiefly in cases of epilepsy. Dose about half a grain or a grain, gradually increased to four or five grains, three or four times a-day.

983 Pills of ammoniaret of copper.

c. PILULÆ AMMONIARETI CUPRI, E. Pills of ammoniaret of copper.

Composed of 16 grains of ammoniaret of copper in fine powder, and four scruples of crumb of bread, beaten into a mass with a sufficient quantity of water or carbonate of ammonia, and immediately divided into 32 equal pills.

One or two of these pills is a moderate dose.

For an account of the ill effects arising from copper

History of Simple and Officinal Medicines.

as a poison, and the means of detecting and obviating them, see Fothergill's Cautions concerning the Poisons of Lead and Copper, and Duncan's Dispensatory.

984 Silver.

289. ARGENTUM, E. L. D. Silver. See CHEMISTRY, p. 681.

Officinal Preparation.

985 Nitrate of silver.

a. NITRAS ARGENTI, E. ARGENTUM NITRATUM, L. D. CAUSTICUM LUNARE. Nitrate of silver. *Nitrated silver. Lunar caustic.*

Prepared by dissolving in a phial, with a gentle heat, four ounces of the purest silver flattened into plates, and cut into pieces, in eight ounces of diluted nitrous acid, mixed with four ounces of distilled water, and evaporating to a dry mass, which is to be put into a large crucible, and placed on a gentle fire, increased gradually till the mass flows like oil; then pouring it into iron pipes previously heated and anointed with tallow, and when cool, putting it into a glass vessel to be well stopped.

Employed chiefly as an escharotic, to destroy the callous edges of ulcers, warts, and other excrescences; but lately much recommended, and employed with some success, as a tonic in cases of epilepsy. It should be begun in very small doses, about one-eighth or one-fourth of a grain, dissolved in distilled water, or made into a pill with crumbs of bread, gradually increasing the dose to a grain or more, twice or three times a-day.

CHAP. IV. *Gaseous Substances.*

986 Oxygenous gas.

290. GAS OXYGENUM. Oxygenous gas. *Vital air.*

On the nature and properties of this gas, see CHEMISTRY, N° 341.

When air, with an increased proportion of oxygen, is respired, it acts as a powerful stimulus, increasing the circulation and animal heat, raising the spirits, and producing a temporary increase of vigour and activity, followed, however, in a short time, by corresponding languor and weariness. From its stimulant effects, the respiration of superoxygenated air has been much recommended in various cases of debility, as chlorosis, epilepsy, asthmatic and dropsical affections; but it seems now falling into disuse, from a conviction that practitioners were too sanguine in their expectations.

See *Alyon Essai sur les Proprietes Medicinales de l'Oxygene*, 8vo. Ward *Dissert. Inaug. de Medicina Pneumatica*, Edin. 1800. Hodge's *Dissert. Inaug. de Oxygenio*, Edin. 1801; and the Practical Synopsis.

987 Gaseous oxide of azote.

291. GAS AZOTI OXIDUM. OXIDUM NITROSUM. Gaseous oxide of azote. *Nitrous Oxide.* See CHEMISTRY, p. 493, 494. where the nature and effects of this gas are detailed at sufficient length.

As the respiration of this gas is not followed by the depression and debility consequent on the application of most other stimuli, it promises fair to become a useful remedy in some cases of debility and atony of the vital powers; but it is not yet much employed except by way of philosophical experiment. See Davy's Researches on Nitrous Oxide.

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292. GAS HYDROGENEUM. Hydrogen gas. *Inflammable air.* See CHEMISTRY, N° 373, *et seq.*

988 Hydrogen gas.

Hydrogen gas diluted with about ten times its quantity of atmospheric air, has been recommended in asthmatic complaints; but its success has not equalled the expectations of physicians.

989 Carbonated hydrogen gas.

293. GAS HYDROGENUM CARBONATUM. Carbonated hydrogen gas. See CHEMISTRY, N° 412.

This gas, which is so deleterious when respired in its pure state, has been strongly recommended when diluted with about 20 parts of atmospheric air, as a remedy in phthisis, in some cases of which it has evidently been of service, relieving the symptoms, and at least arresting the progress of the disease. It should, however, be employed with great caution, and at first largely diluted.

990 Carbonic acid gas.

294. GAS ACIDUM CARBONICUM. Carbonic acid gas. *Fixed air.* See CHEMISTRY, N° 595.

Besides the solution of this gas in water (see N° 875.), used internally as a tonic and refrigerant, the gas itself, as evolved from fermenting substances, is a good stimulant or antiseptic application to foul ulcers and cancerous sores. The modification of this substance which is contained in yeast or barm, has been much employed of late in typhus, but we believe with no material benefit.

991 Caloric.

295. CALORICUM. Caloric. *Heat.* See CHEMISTRY, Chap. iii.

It would be in vain for us here to attempt any account of the effects of heat on the human body, and these have been amply detailed, both by chemical and physiological writers. It acts as a powerful stimulus, and as such is often employed, especially in the form of warm and vapour baths, in various cases of debility and atony of the system. The effect and uses of the warm and vapour baths have been already mentioned under WATER, as have the effects and uses of the cold bath.

992 Light.

296. LUMEN. Light. See CHEMISTRY, Chap. ii.

Besides its effect on the eye, in producing vision, light evidently acts as a general and powerful stimulus, raising the spirits, and increasing the vigour and activity of the body. See Rush's Lectures on Animal Life.

993 Electricity.

297. ELECTRICITAS. Electricity.

Common electricity acts as a powerful stimulus on the system, in proportion to the degree of concentration in which it is applied. When applied under the form of a stream, or continued discharge of electric fluid, its effects are the most gentle; but in general, when applied in the form of sparks, it is more active, but its effects are more confined; and when applied by way of a shock, it acts very powerfully, producing an agitation of the muscles of the part through which the shock is discharged; and if the shock is violent, the whole body partakes of the agitation. Electricity

History of Simple and Officinal Medines.

lectricity has been found of service, chiefly in cases of paralysis, and of uterine obstruction dependent on debility.

For the mode of applying electricity to the body, under its various states, we must refer to Cavallo's Medical Electricity, and Cuthbertson's Practical Electricity and Galvanism.

994 Galvanism.

298. GALVANISMUS. Galvanism.

This modification of electricity is found to have produced still greater effects on the human body, when applied under particular circumstances, into which we have not now room to enter. Much has of late been written on the efficacy of this powerful agent in the cure of various diseases, but like most other new remedies, its powers have been greatly overrated. It appears to have been most successful in cases of local paralysis, or nervous atony. In particular, it has in several instances relieved deafness, especially that species which seems to arise from torpor of the auditory nerve.

For the effects of galvanism on the body, and its application in medicine, see Wilkinson's Elements of Galvanism, vol. ii. p. 441.; Cuthbertson's Electricity and Galvanism; the Edinburgh Medical and Surgical Journal, &c.

ADDENDUM.

History of Simple and Officinal Medicines.

The following was omitted among the preparations of iron.

995 Precipitated carbonate of iron.

g. CARBONAS FERRI PRÆCIPITATUS, E. Precipitated carbonate of iron.

Prepared by decomposing a solution of sulphate of iron by a solution of carbonate of soda; washing and drying the precipitate.

Similar in its virtues to 961. Dose five to 30 grains.

The space allotted to this article was so small, and the time for preparing it so short, that it is, of necessity, much less full and complete than it might otherwise have been. As it was impossible, under such circumstances, to produce any thing like an original and complete treatise, the compiler has endeavoured to render as useful as possible the selection that he found it necessary to make, and to supply the unavoidable deficiencies by a reference to the most respectable works on the subject.

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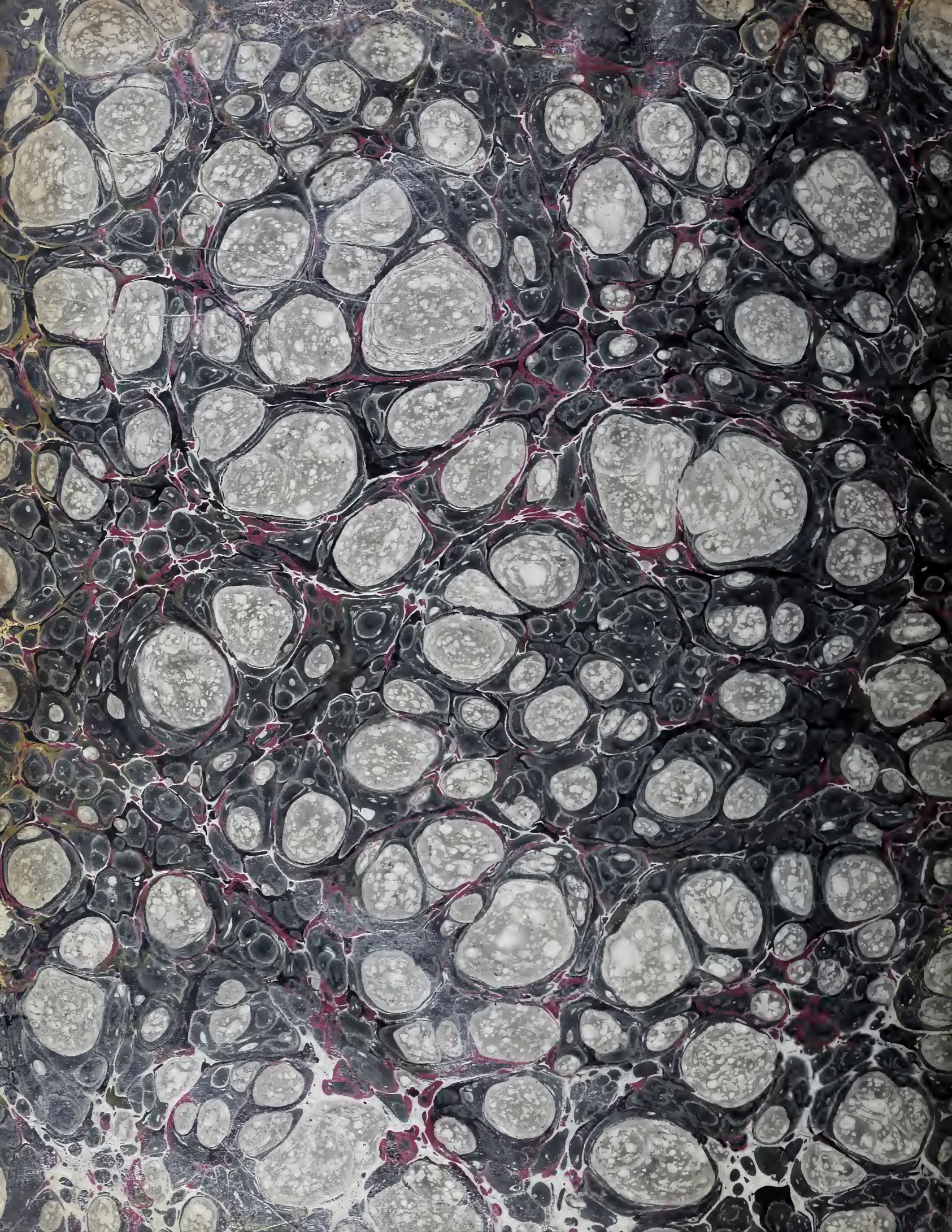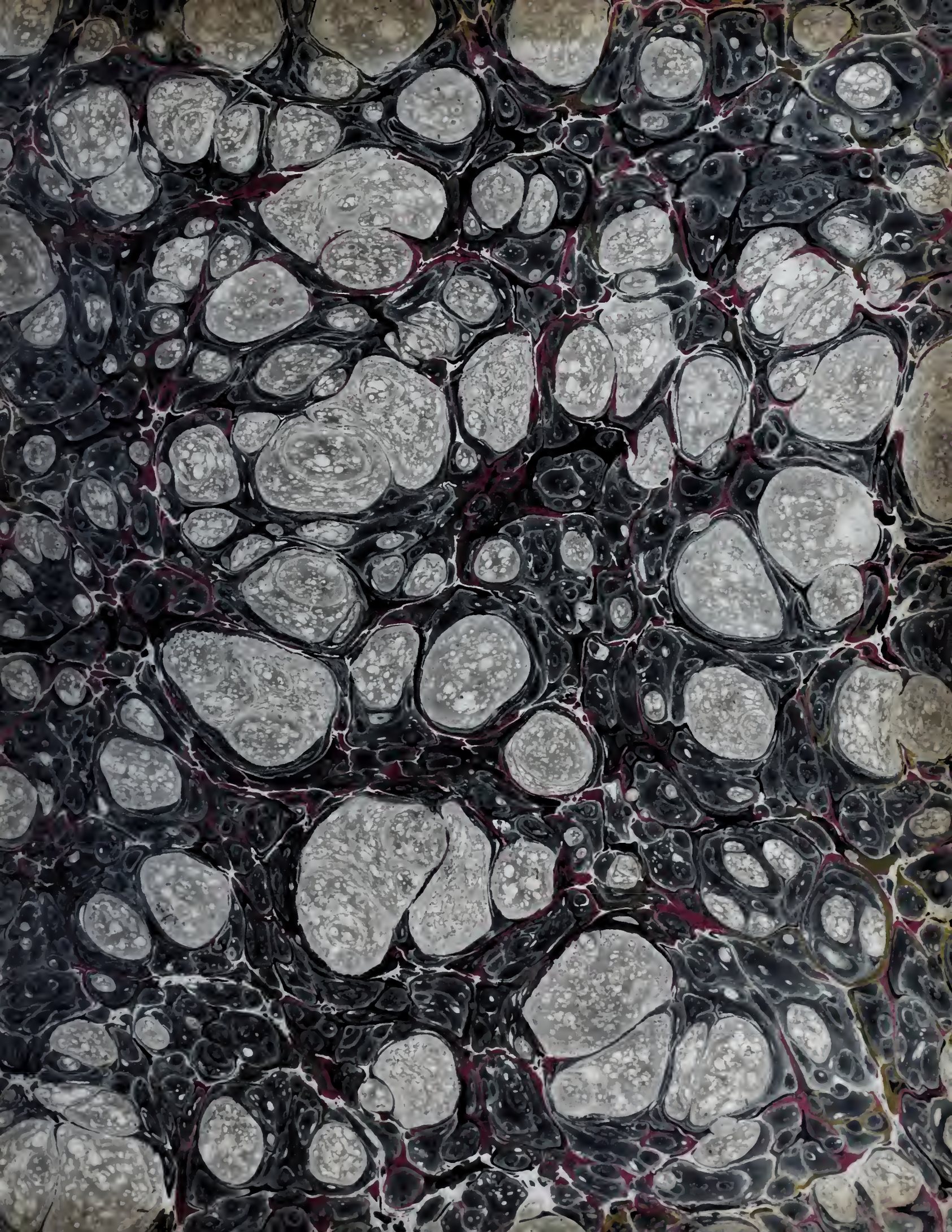
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